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*SELAGINELLAE*  
OF CONTINENTAL  
NORTH AMERICA

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# THE HETEROPHYLLOUS SELAGINELLAE OF CONTINENTAL NORTH AMERICA

By A. H. G. ALSTON

THIRTY of the fifty-five species dealt with in this paper are restricted to the area. *S. armata* Bak. occurs, however, in Florida and Cuba; *S. ovifolia* in British Honduras and the islands of Jamaica, Hispaniola, and Puerto Rico; and *S. microdendron* in Mexico, British Honduras, Guatemala, Cuba, and Jamaica. Such ranges are not unexpected, as Florida is believed to have been connected with Cuba;<sup>1</sup> and Puerto Rico, Hispaniola, and Jamaica with Honduras.<sup>2</sup> There is also a wide-spread species, *S. convoluta*, which is found in suitable dry areas from Yucutan and Hispaniola southwards to Paraguay. Another wide-spread species, also with a preference for relatively dry areas, is *S. marginata*, which is scattered over an area from Mexico to Paraguay. The implication seems to be that while the ranges of *S. microdendron* and *S. ovifolia* date from the Pliocene, the number of dry areas has probably increased since that period, and this has enabled the species which tolerate such conditions to extend their range. If the dry areas, which are widely separate, were of ancient date they might have been expected to possess endemic species. The South American element in the flora also includes *S. umbrosa* Lemaire which occurs from Mexico to Colombia and is, perhaps, doubtfully native in Tobago and Barbados, as well as *S. flagellata* and *S. diffusa*, both of which reach Trinidad. These three islands belong floristically to South America rather than to the West Indies. Of the species which are also found in South America, three reach their northern limit in Panama, one in Nicaragua, and ten in Mexico. Eight species are restricted to Mexico. *S. pilifera* is found only in a small area in north Mexico and just over the U.S. boundary, and the widespread *S. apoda* has some outlying localities in Mexico. These localities are similar to those given for other plants by Miranda and Sharp.<sup>3</sup> Four species reach their southern limit in Guatemala, one in Salvador, four in Honduras, one in Nicaragua, three in Costa Rica, and four in Panama.

This account has been based on the British Museum collection (BM) and on specimens on loan from the Botanisches Museum, Berlin-Dahlem (BD), the Jardin Botanique, Brussels (Br.), the Field Museum, Chicago (F), the Universitetets Botaniske Museum, Copenhagen (H), the Royal Botanic Gardens, Kew (K), the New York Botanical Garden (NY), the Muséum National d'Histoire Naturelle, Paris (P), the National Museum, Prague (Pr.), the Naturhistoriska Museum, Stockholm (St.), the Escuela Agrícola Panamericana, Tegucigalpa (T), the Naturhis-

<sup>1</sup> C. Schuchert. *Historical Geology of the Antillean-Caribbean Region*. New York, 1935. Pp. 247-8, maps, t. 9.

<sup>2</sup> Op. cit. (1935), pp. 55, 107, and maps 14, 15.

<sup>3</sup> F. Miranda & A. J. Sharp. *Characteristics of Vegetation in Certain Temperate Regions of Eastern Mexico*. Ecology xxxi: 317 (1950).



torisches Museum, Vienna (V), and the Smithsonian Institution, Washington (W). The author wishes to express his gratitude for the loan of this material.

## KEY TO THE SPECIES

- Stems not articulate, rarely sulcate; rhizophores ventral:  
 Stems tufted, curling inwards when dry; leaves usually subcoriaceous:  
 Lateral leaves turning dark brown or reddish with age;  
 median leaves obtuse or shortly mucronate:  
 Median leaves ciliolate, not margined; old leaves dark brown (Yucatan and Guatemala) . . . . . 1. *convoluta*  
 Median leaves entire, margined:  
 Old leaves dark brown; median leaves with narrow margins and deciduous aristae (Tamulipas and Nuevo Leon) . . . . . 2. *novoleonensis*  
 Old leaves reddish; median leaves obtuse, with broad white margins (Arizona to Salvador) . . . . . 3. *lepidophylla*  
 Lateral leaves turning pale (or light reddish) brown or straw-coloured with age; median leaves acute or aristate:  
 Median leaves lanceolate, not margined . . . . . 4. *pilifera*  
 Median leaves ovate, white-margined:  
 Old leaves drying buff; leaves silvery beneath . . . . . 5. *pallescent*  
 Old leaves drying light reddish-brown; leaves dull green beneath . . . . . 12. *microdendron*  
 Stems not tufted; leaves usually membranaceous:  
 Stems reddish at base, erect:  
 Leaves of main stem uniform, directed upwards; stems bright red:  
 Lateral leaves ciliate at base only . . . . . 6. *umbrosa*  
 Lateral leaves minutely and evenly denticulate on the upper margin . . . . . 7. *haematodes*  
 Leaves of main stem dimorphous, except at base of stem; stem pale reddish . . . . . 8. *hoffmannii*  
 Stems not reddish, or prostrate with reddish patches (*S. delicatissima*):  
 Leaves on main stems uniform:  
 Main stems erect; leaves membranaceous:  
 Branches (including leaves) about 15 mm. across; lateral leaves attached at posterior angle (i.e. not produced at base), strongly ciliate . . . . . 9. *bombycina*  
 Branches (including leaves) not exceeding 13 mm. across; lateral leaves attached more or less centrally:

Lower margin of lateral leaves truncate at base:

Lateral leaves strongly ciliate; axillary leaves oblong-lanceolate. . . . . 10. *anceps*

Lateral leaves denticulate; axillary leaves lanceolate . . . . . 11. *oaxacana*

Lower margin of lateral leaves rounded at base:

Lateral leaves of main stem ovate, not overlapping, and (except *S. illecebrosa*) sparingly ciliate at base:

Median leaves exauriculate:

Median leaves with broad white margins; microspores smooth or slightly verrucose:

Old leaves drying buff; leaves silvery beneath . . . . . 5. *pallescent*

Old leaves drying light reddish-brown; leaves dull green beneath 12. *microdendron*

Median leaves not white-margined; microspores papillose:

Lateral leaves subequal on main stem or lower half of frond-like portion . . . . . 13. *pulcherrima*

Lateral leaves dimorphous throughout frond-like portion . . . . . 14. *illecebrosa*

Median leaves auriculate:

Median leaves mucronate, denticulate, short aristate . . . . . 15. *californica*

Median leaves aristate, ciliate, with arista more than half as long as lamina . . . . . 16. *mosorongensis*

Lateral leaves of upper half of main stem spreading, and overlapping, closely ciliate . . . . . 17. *viticulosa*

Main stems prostrate (and see no. 37 *S. mollis*); leaves subcoriaceous, glaucous green, rounded at apex, rarely apiculate . . . . . 18. *schaffneri*

Leaves everywhere dimorphous, sometimes smaller at base of main stem:

Stems and/or branches without flagelliform apices; plants not soboliferous:

Stems prostrate, rooting throughout:

Median leaves denticulate, rarely with a few scattered cilia towards the base:

## THE HETEROPHYLLOUS SELAGINELLAE OF

- Median leaves with arista less than half as long as lamina; microspores without stalked papillae:
- Lateral leaves pubescent on the upper surface . . . . . 19. *lindenii*
- Lateral leaves glabrous:
- Lateral leaves obtuse, concave:
- Microspores densely tuberculate . . . . . 20. *delicatissima*
- Microspores rugose . . . . . 21. *douglasii*
- Lateral leaves acute:
- Median leaves with 3-4 rows of elongated colourless marginal cells . . . . . 22. *ludoviciana*
- Median leaves with 1 (-2) rows of elongated marginal cells . . . . . 23. *apoda*
- Median leaves with arista nearly as long as lamina; microspores with stalked, capitate papillae . . . . . 24. *tarapotensis*
- Median leaves ciliate in upper half:
- Lateral leaves less than twice as long as broad:
- Median leaves spaced, not white-margined . . . . . 25. *ovifolia*
- Median leaves imbricate, white-margined . . . . . 26. *reflexa*
- Lateral leaves more than twice as long as broad, ciliate (except in no. 27 *guatemalensis*):
- Rhizophores stout and straight; leaves herbaceous; microspores more or less reticulate, with high muri:
- Lateral leaves diverging at 45°; median leaves ovate:
- Median leaves acuminate, with narrow white margin; lateral leaves rounded at base, denticulate or shortly ciliate. . . . . 27. *guatemalensis*
- Median leaves aristate, with broad white margin; lateral leaves subcordate, long ciliate . . . . . 28. *huehuetenangensis*
- Lateral leaves forming a right-angle with the stem; median leaves suborbicular:
- Upper surface of leaves glabrous; leaves not rolling up when dry . . . . . 29. *idiospora*



- Upper surface of leaves usually pubescent; leaves becoming in-rolled when dry . . . . . 30. *revoluta*
- Rhizophores filiform; leaves membranaceous:
- Median leaves narrowly elliptic; microspores verrucose . . . . . 31. *armata*
- Median leaves obliquely ovate; microspores rugose . . . . . 32. *schiedeana*
- Stems suberect; rhizophores confined to the lower half of the stem:
- Lateral leaves obliquely oblong:
- Rhizophores filiform; leaves membranaceous:
- Microspores with slender spines; sporophylls uniform . . . . . 42. *cladorrhizans*
- Microspores smooth; sporophylls dimorphous . . . . . 34. *lychnuchus*
- Rhizophores stiff and straight; leaves herbaceous:
- Arista of median leaves less than half as long as leaves; median leaves denticulate; sporophylls dimorphous . . . . . 33. *stenophylla*
- Arista of median leaves more than half as long as leaves; median leaves usually ciliate:
- Sporophylls dimorphous . . . . . 34. *lychnuchus*
- Sporophylls uniform:
- Lateral leaves obtuse, not shining, rounded at base . . . . . 35. *martensii*
- Lateral leaves subacute, shiny, cordate . . . . . 36. *estrellensis*
- Lateral leaves ovate, subacute:
- Lateral leaves without false nerves, glabrous on the upper surface; megaspores pale yellowish or white:
- Lateral leaves ciliate:
- Plants 3 or more inches high:
- Erect stems springing from a wide-creeping, prostrate rhizome . . . . . 37. *mollis*
- Erect stems shortly decurrent at base . . . . . 40. *orizabensis*
- Plants up to 1.5 inches high . . . . . 38. *minima*
- Lateral leaves denticulate . . . . . 15. *californica*

- Lateral leaves with 2 false nerves, usually pubescent in lower half; megaspores dull reddish-brown . . . . . 39. *porphyrospora*
- Stems and/or branches with flagelliform apices, or plants soboliferous:
- Lateral leaves ciliate; median leaves strongly auriculate; stems sparingly soboliferous at base, suberect, with rhizophores confined to the lower third:
- Microspores smooth . . . . . 41. *novae-hollandiae*
- Microspores with stalked papillae . . . . . 37. *mollis*
- Lateral leaves entire or ciliolate-denticulate; median leaves scarcely auriculate; stems and/or branches flagelliform; microspores smooth, warted, or spiny:
- Branches with flagelliform apices or stems soboliferous; main stems rarely flagelliform:
- Megaspores dull reddish-brown; lateral leaves with 2 false nerves, acute, upper surface usually pubescent in lower half; branches flagelliform, terminated by propagula or bulbils; microspores smooth or slightly warted . . . . . 39. *porphyrospora*
- Megaspores creamy or greyish-white; lateral leaves without false nerves, obtuse or subacute, glabrous; branches sometimes flagelliform; microspores with slender spines . . . . . 42. *cladorrhizans*
- Branches very rarely flagelliform; main stems normally flagelliform and rooting at tip; megaspores creamy white; lateral leaves without false nerves, glabrous; microspores not spiny . . . . . 43. *flagellata*
- Stems articulate; rhizophores dorsal:
- Branches pubescent (Panama species):
- Plant scandent; lateral leaves of branches 2.5 mm. long, those of main stem larger, distant, ascending . . . . . 44. *exaltata*
- Plant suberect; lateral leaves up to 7 mm. long, rather close, spreading . . . . . 45. *articulata*
- Branches glabrous:
- Main stems simple, erect, with subequal leaves towards the base . . . . . 46. *arthritica*



- Main stems branched from the base, prostrate, or rarely ascending; leaves dimorphous throughout; lateral leaves spreading:
- Lateral leaves subcoriaceous; median leaves broadly white-margined . . . . . 47. *marginata*
- Lateral leaves membranaceous; median leaves not conspicuously white-margined:
- Main stems flagelliform at apex . . . . . 48. *sertata*
- Main stems not flagelliform at apex:
- Median leaves with two subequal auricles:
- Auricles of median leaves very short; median leaves aristate; lateral leaves oblong; stems rooting in the lower two-thirds . . . . . 49. *silvestris*
- Auricles of median leaves large, equal to one quarter of lamina; median leaves acuminate; lateral leaves ovate-oblong; stems rooting in the lower third . . . . . 50. *galeottii*
- Median leaves with one auricle or unequal auricles, one twice as large as the other:
- Median leaves not acuminate; lateral leaves up to 2 mm. long . . . . . 51. *intacta*
- Median leaves acuminate or aristate; lateral leaves about 4 mm. long:
- Lateral leaves ovate-lanceolate, with large, long ciliate auricles:
- Median leaves shortly auricled, often ciliate, somewhat acuminate . . . . . 52. *diffusa*
- Median leaves long auricled, not ciliate, shortly aristate . . . . . 53. *horizontalis*
- Lateral leaves narrowly oblong, with short ciliolate auricles:
- Axillary leaves auriculate; lateral leaves parallel-sided:
- Auricles of axillary leaves subparallel . . . . . 54. *eurynota*
- Auricles of axillary leaves divergent . . . . . 55. *schizobasis*
- Axillary leaves exauriculate; lateral leaves tapering towards the apex . . . . . 56. *kunzeana*

1. ***Selaginella convoluta*** (Arn.) Spring in Mart., Fl. Brasil. i, 2: 131 (1840); in Bull. Acad. Brux. x: 136 (1843).—Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 705 (1886).

'*Doradilla*' Titford, Sketches towards a Hortus Botanicus Americanus: ix, t. 13 fig. 5 (1812). *Lycopodium convolutum* Arn. in Mem. Werner. Nat. Hist. Soc. v: 199 (1824); reimpr. in Mém. Soc. Hist. Nat. Par. i, 2: 347 (1824).<sup>1</sup>

<sup>1</sup> *Lycopodium convolutum* (Beauv.) Desv. (1814) was published only in synonymy.

*Lycopodium revolutum* Hook. & Grev. in Hook., Bot. Misc. ii: 381 (1831) err. typ.

*Selaginella longispicata* Underw. ex Millsp. in Publ. Field Columb. Mus., Bot. Ser. i: 287, t. 10 (1896).—Hieron. in Hedwigia lviii: 286 (1917).—Millsp. in Publ. Field Mus. Nat. Hist., Bot.

Ser. iii: 197 (1930).—Boys, Ethno-Bot. Maya: 266 (1931).

? *Ceterach officinarum* sensu Ramirez, Pl. Mex.: 75 (1902); non DC.

MEXICO. Yucatan: without exact locality (ex Titford); at the base of the Eastern hills, where it invests fissures of the larger rocks, *Valdez* 50 (BM; NY; W); forest land near Izabal, *Gaumer* 825 (type of *S. longispicata*, BM; NY; W); Muna, in crevices along stony trail, *Steere* 2171 (W); Nohcacab and Mérida, *Schott* 669 (BM; W).

GUATEMALA. Montagua, *Godman & Salvin* 146 (K; NY).

HONDURAS. Crevices of rocks, along Río Yeguaré, near Galeras, El Paraíso, 850 m., *Williams & Molina* 14910 (W).

Geographical range: Yucatan, Honduras, Cuba and Hispaniola southwards to Paraguay and Bolivia. Type from Brazil.

'Doradilla' is given as the Spanish name by Titford and Millspaugh. It is, however, applied to many other species of pteridophytes including *S. lepidophylla*, and seems originally to have been a name for *Ceterach*. Schott and Gaumer give 'Mutsoc' as the Maya name; this should be 'X-much-coc' according to Boys, meaning 'dried pectoral', a name applied equally to *S. pallescens*. It is used in village medicine for the treatment of catarrh. Ramirez, on the authority of Doudé, gives 'Xmuchcoc' for *Ceterach officinarum*.

2. ***Selaginella novoleonensis*** Hieron. in Engl. & Prantl, Nat. Pflanzenfam. i, 4: 676 (1901); in Hedwigia xli: 173 (1902).—Davis, Life of Pringle: 332, 506 (1936).

*Selaginella pilifera* sensu Davis, Life of Pringle: 60, 332, 501, 506, 673 (1936); non A. Braun.

MEXICO. Tamaulipas: limestone ledges, Cerro de los Armadillos, near San José, Sierra de San Carlos, *Bartlett* 10177 (BM; W); barren rocky cliffs and banks of Río San Marcos, west of Ciudad Victoria, *Meyer & Rodgers* 2510 (BM); mountains above Ciudad Victoria, *Orcutt* 367 (BM). Nuevo Leon: limestone ledges, near Monterey, *Pringle* 2038 (NY); limestone ledges, near Sierra de la Silla, Monterey, *Pringle* 2489 (BM; NY; W); 70 km. north of Monterey, 500 m., *Copeland* 173 (BM).

Geographical range: confined to the limestone areas of Tamaulipas and Nuevo Leon, Mexico.

A specimen from 'mountains near Ciudad Victoria, Tamaulipas' (*Orcutt* 367 (W)) has rather reddish leaf-bases towards the apex of the shoots and approaches *S. lepidophylla*. The specimens from Sonora (damp shady rocks, Huehuerachi, *Lloyd* 506 (NY; W), and base of cliff near summit, 1,050–1,150 m., ridge south of Arroyo Gochico, east of San Bernardo, *Pennell* 19553 (W)) are also somewhat intermediate.

3. ***Selaginella lepidophylla*** (Hook. & Grev.) Spring in Mart., Fl. Brasil. i, 2: 126 (1840); in Bull. Acad. Brux. x: 137 (1843).—T. Moore in Gard. Chron. 1872: 1068, figs. 252 and 253 (1872).—Wats., Bot. Calif. ii: 350 (1880).—Orcutt, Check-List Fl. Pl. S. and L. Calif.: 12 (1885).—Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 707 (1886).—Wittrock in Act. Hort. Berg. i, 8: 47, t. 4 (1891).—Hieron. in Engl. & Prantl, Nat. Pflanzenfam. i, 4: 675, fig. 403 (1901).—Bray in Bot. Gaz. xxxii: 286 (1901).—Clute, Fern Allies: 163 cum fig. (1905).—Balthis in Amer. Bot. xxi: 52 cum 2 fig.



(1915).—Palmer in Amer. Fern Journ. ix: 21 (1919).—Maxon in Amer. Fern Journ. xiii: 74 (1923).—Domin, Pteridophyta in Nová Encykl.: 55, fig. 28 (1929).—Hegi, Ill. Fl. Mittel-Europ. vii: 33 (1931).—Johnston in Journ. Arn. Arb. xxiv: 328 (1943).—Conzatti, Fl. Tax. Mex. i: 140 (1946).—Phillips in Amer. Fern Journ. xxxvii: 49 (1947).—A. Tryon in Ann. Miss. Bot. Gard. xxxvi: 423, t. 30 fig. 31 (1949).

*Lycopodium lepidophyllum* Hook. & Grev. in Hook., Bot. Misc. iii: 106 (1833); Hook., Ic. Pl. ii: tt. 162, 163 (1837).—Meisn. in Linnaea xii: 157, t. 3 (1838).

*Lycopodium circinale* sensu Mart. & Gal. in Mém. Acad. R. Brux. xv: 10 (1842); in Compt. Rend. Acad. Sc. xviii: 502 (1844); non L.

? *Selaginella thoytsiana* Curd in Proc. Roy. Hort. Soc. iii: 285 (1863), *nom. nud.*

*Selaginella rediviva* Forrer ex Wittrock in Act. Hort. Berg. i, 8: 48 (1891) in syn.

? *Lycopodium nidiforme* Sessé & Mociño, Fl. Mex. ed. 2: 289 (1894).

UNITED STATES. Arizona: (ex Clute and Phillips). New Mexico: foothills of the Magdalena Mts., *Ferriss* (ex Maxon); San Andreas Range, *Ferriss* (ex Maxon). Texas: *Wright* 827 (BM); Sierra Blanca, *Mulford* 266 (K); Del Rio, Valverde Co., *Palmer* 12364 (ex ipse); Devil's River, Valverde Co., *Palmer* 11366 (ex ipse); Montell, Uvadale Co., *Palmer* (ex ipse); Trans Pecos region, also eastward on limestone bluffs to the Frio R. (ex Bray).

MEXICO. Lower California: (ex Wittrock, Watson, and Orcutt). Sonora: Sierra Madre, *Seeman* (BM). Chihuahua: Santa Eulalia Mts., *Pringle* 203 (BM; NY). Coahuila: General Sepada, *Palmer* 327 (NY). Nuevo Leon: Monterey, *Palmer* 1439, 1440 (ex Hemsl.). Tamaulipas: near Tampico, *Palmer* 245 (NY); near S. Vincente-Jaamave, *Rozynski* 42 (NY). Zacatecas: Cedros, rocky hills, *Kirkwood* 134 (ex Johnst.). San Luis Potosi: *Schaffner* 14 (NY); Escobrillos Mts., *Schaffner* 935 (NY). Nayarit: San Blas, *Dundas* (ex Hook. & Grev., type); Rincon de Mateo, near Yxtlan, 1,100 m., *Mexia* 770 (BM; NY); Ixtlan, *Jones* 23493 (NY). Jalisco: La Barranca, Guadalajara, *Jones* (BM; NY); near Rio Blanco, Guadalajara, *Rose & Painter* 7498 (BM); near Guadalajara, *Pringle* 11275 (NY). Queretaro: near Queretaro, *Rose* 11198 (NY). Colima: Manzanillo, *Palmer* 1401 (NY). Michoacan: (ex Mart. & Gal.). Mexico: Bejucos, Distr. Temascaltepec, *Hinton* 7388 (BM). Morelos: Cuernavaca, *Schmitz* (ex Hemsl.). Puebla: San Lorenzo, near Tehuacan, *Liebmann* (H); Sierras, Acheté, near Puebla, *Arsène* 1926 (W). Oaxaca: near San Luis Tultitlanapa, Puebla, *Purpus* 3155 (BM; NY; W); Santa Catarina, *Rusby* 83 (NY).

SALVADOR. Near Cuisnagua, *Hayes* (BM).

Geographical range: confined to Arizona, New Mexico, Texas, Mexico and Salvador.

Hooker's record for Peru, *Alex. Caldcleugh*, was doubtless an error of locality. Hooker himself stated (Ic. Pl.: t. 162) that Caldcleugh's specimen was from Mexico, and that specimens later formed an article of commerce between Mexico and Peru. In addition to Mexico and Peru Spring gives California, *Gaudichaud*, which probably refers to Lower California. However, Gaudichaud was never in Mexico or California. Luer's record for Hawaii (Honolulu, *Wawra* 2517) in Flora lvi: 440 (1875) was stated to be an error by Luer himself (Flora lix: 302 (1876)).

The Mexican name is given as 'Siempreviva' by several authors and as 'Flor de la Peña' by Johnston. Martens and Galeotti give 'Flor de piedra' and in Michoacan 'Doradilla'.

An extract was at one time sold in Germany under the name 'Pnigodin' as a remedy for whooping-cough (Pharmaz. Zeit. lix: 92 (1914)).

There is no specimen from Arizona in Clute's herbarium at Butler University (letter from Prof. J. E. Potzger 25.xi.1952) and the basis of his record is unknown.

The remarkable spirally twisted axis has been figured and described by Wojnowić (Beiträge zur Morphologie, &c., der S. lepidophylla, Dissertation 1890: 6-7, t. 1, fig. 3). The morphological explanation of this peculiar type of axis is that the apex branches dichotomously, and while the right-hand branch of the dichotomy grows more vigorously and forms a radial side-shoot, the left-hand branch continues to grow forward and slightly upwards, at the same time curving spirally inwards. After a time this shoot again forks dichotomously, with the left-hand branch again growing forward as before. As this process is indefinitely repeated, the left-hand branches form a corkscrew-like spiral 'main stem', while the right-hand branches radiate out to form the rosette of spirally arranged frond-like branch-systems. It is these branches which curl inwards to form the familiar ball-like structure which is seen in dry weather.

4. **Selaginella pilifera** A. Braun in Index Sem. Hort. Bot. Berol., 1857, App.: 20.—Hemsl. in Biol. C.-Amer. iii: 708 (1886).—Stahl in Karsten & Schenck, Vegetationsbilder ii, 4: t. 21 (1904).—Clute, Fern Allies: 164 (1905).—'A.O.' in The Garden lxxvii: 210 cum fig. (1905).—Johnst. in Journ. Arn. Arb. xxiv: 328 (1943).—Conzatti, Fl. Tax. Mex. i: 141 (1946).—A. Tryon in Ann. Miss. Bot. Gard. xxxvi: 423, t. 30, fig. 32 (1949).

*Selaginella pringlei* Bak. Fern Allies: 88 (1887).—Clute, Fern Allies: 163 (1905).—Davis, Life of Pringle: 20, 332 (1936).—Conzatti, Fl. Tax. Mex. I: 141 (1946).

*Selaginella pilifera* var. *pringlei* (Bak.) Morton in Amer. Fern Journ. xxix: 15 (1939).

UNITED STATES. New Mexico: Guadalupe Mts., *Goodding* 803 (ex Morton). Texas: Chenates, *Neally* 557 (NY); Upper McKittrick Canyon, Guadalupe Mts., 1,980 m., *Moore & Steyermark* 3502 (BM); mountains below El Paso, *Wright* (ex A. Braun); high rocky bluffs of Devils' R., Val Verde Co., *Wright* s.n. (ex Johnst.).

MEXICO. Sonora: Valley of Rio Bavispe, *White* 522 (ex Johnst.). Chihuahua: Santa Eulalia Mts., *Pringle* 271 (BM; NY; W, type-collection of *S. pringlei*), 886 (NY), *Wilkinson* (W); Sierra Almagre, *Johnston & Muller* 1140 (ex Johnst.). Coahuila: in crevices of dry, sloping rocky walls of cañon, Saltillo, *Palmer* 321 (NY; W), *Arsène* 10677 (W); Yerda Spring, near Muzquiz, *Marsh* 270 (ex Johnst.); Muzquiz-Mariposa, *Marsh* 1042 (ex Johnst.); western end of Sierra Fragua, *Johnston* 8748 (ex Johnst.). Nuevo Leon: Montemorelos, *Nelson* 6700 (W); near Monterey, *Pringle* 2041 (NY), 11276 (NY; W), *Dodge* 120 (W), *Orcutt* 1234 (W); rocky limestone bank, 800-900 m., Hacienda 'Vista Hermosa', south of Villa Santiago, *Pennell* 16927 (W); Sierra Madre above Monterey, 920 m., *Pringle* 13959 (W). Tamaulipas: limestone ledges, Cerro de los Armadillos, near San José, *Bartlett* 10176 (W). San Luis Potosi: *Parry & Palmer* 1008 (W); rocky sandstone west of San Luis Potosi, 1,900-2,100 m., *Pennell* 17636 (W); rock faces near falls, El Salto, beyond Meco, 12 km. north of Antiguo Morelos-Ciudad Maiz highway, *Moore & Gatty* 5008 (BM).



The type-specimen of *S. pilifera* was cultivated in Berlin. There is a duplicate at the British Museum. Braun also mentioned Wright's specimen.

Geographical range: confined to the extreme south of New Mexico, south-west Texas, and northern Mexico.

Johnston states that *S. pilifera* is found on sheltered, moderately moist cliffs in the oak belt, but not with *S. lepidophylla* on the lower and open slopes of the mountains.

Morton (op. cit.: 15) states that in *S. pilifera* the outer margin of the lateral leaves is serrulate at the apex, and that of *S. pringlei* quite entire. I find the median leaves of the type-collection of *S. pringlei* to be serrulate and the distinction, therefore, appears insufficient even for a variety.

5. ***Selaginella pallescens*** (Presl) Spring in Mart., Fl. Brasil. i, 2: 132 (1840).—Knobloch in Amer. Fern Journ. xxxii: 137 (1942).

*Lycopodium pallescens* Presl, Rel. Haenk. i: 79 (1825).

*Lycopodium cuspidatum* Link, Hort. Berol. ii: 161 (1833).—Kunze in Linnaea xiii: 151 (1839); op. cit. xviii: 304 (1844).

*Selaginella cuspidata* (Link) Link, Fil. Spec. 158 (1841).—Watson in Proc. Amer. Acad. Art. Sci. xxi: 445 (1886).—Loesen. in Bull. Herb. Boiss. Ser. 2, iii: 83 (1903).—Donn. Smith, Enum. Pl. Guat. iv: 179 (1895); op. cit. vii: 65 (1905).—Maxon in Contr. U.S. Nat. Herb. xiii: 23 (1909).—Conzatti Fl. Tax. Mex. i: 140 (1946).

? *Selaginella incana* Spring in Mém. Acad. R. Belg. xxiv: 157 (1850).

? *Selaginella sulcangula* Spring in Bull. Acad. Brux. x: 137 (1843);—in Mém. Acad. R. Belg. xxiv: 163 (1850) pro parte excl. planta jamaicensis.

*Selaginella emmeliana* v. Geert in Rév. Hort. Belg. x: 220, fig. 20 (1884).

*Selaginella cuspidata* var. *elongata* Spring in Mém. Acad. R. Belg. xxix: 67 (1850).—Hieronymus in Engl., Bot. Jahrb. xxxiv: 577 (1904).—Christ in Bull. Herb. Boiss. sér. 2, vi: 288 (1906).—Hieron. in Verh. Bot. Verh. Brandenb. li: 10 (1910).—Maxon & Standl. in Proc. Biol. Soc. Wash. xliii: 178 (1930).—Conzatti Fl. Tax. Mex. i: 140 (1946).

*Selaginella lepidophylla* sensu Donn. Smith, Enum. Pl. Guat. iv: 179 (1895); non Spring.

*Lycopodium circinale* sensu Schlecht. & Cham. in Linnaea v: 622 (1830); non L.

*Selaginella pulcherrima* sensu Fourn., Mex. Pl. 147 (1872) pro parte; non Liebm.

MEXICO. Without exact locality, *Haenke* (Pr., type of *L. pallescens* Presl; photo BM). Sonora: Sierra de Alamos, *Rose, Standley & Russell 12859* (NY); Caramachi, *Gentry 1197* (BM). Chihuahua: SW. Chihuahua, *Palmer 85* (BM; NY); Mojarachic (ex Knobloch). Nuevo Leon: Sierra Madre, near Monterey, *Pringle 1979* (BM; NY). Sinaloa: La Noria, in shady, damp places, 245 m., *Mexia 221* (BM); Panuco, 700–750 m., *Pennell 20184* (W); San Ignacio, *Ortega 366* (K), 430 (K). Tamaulipas: San José, *Kemp* (NY). Durango: near Durango, 1,900 m., *Palmer 886* (BM; NY). San Luis Potosi: Alvarez, *Palmer 179* (NY); San Francisco, *Schaffner* (NY); San Miguelito Mts., *Schaffner 13* (NY); Tamasunchale, 250 m., in brush on limestone cliff, *Copeland 172a* (BM); near San Luis Potosi, *Parry & Palmer 1009* (K). Tepic: *Palmer 1936* (NY); Cerro de la Cruz, near Tepic, damp places and shady thickets, 1,000 m., *Mexia 653* (BM; NY); woodland on hill east of Tepic, 950–1,000 m., *Pennell 19954* (W); shaded bank, 700–750 m., Trapichillo, *Pennell 19831* (W). Jalisco: Near Guadalajara, shaded banks, *Pringle 2592* (BM; NY), 2037 (NY). Vera Cruz: Zacuapan, *Purpus 6193A* (BM), 8253 (W), 8258 (NY), 8925 (BM; NY); 1,000 m., *J. Purpus 126* (BM); Barranca de Zacuapan, *Purpus 5791* (BM; NY); Barranca de Tenompa, Zacuapan, 900 m., *J. Purpus 125* (BM); Cordoba, *Müller 259* (NY);

Orizaba, *Bourgeau* 2549 (K), 2769 (BM; K; NY), *Hahn* 2540 (K), *Müller* 365 (NY), 425 (NY); *Seaton* 307 (NY); *Botteri* 77 (BM), *Copeland* 172 (BM); Mirador, *Sartorius* (NY), *Linden* 86 (K), *J. Purpus* 129 (W); Jalapa, *Schiede* (BM), 825 (NY), *Orcutt* 2808 (BM); woods of Rio Blanco, Orizaba, *Bourgeau* 2540 (NY; W). Colima: Alzada, *Orcutt* 4651 (BM); Nevado de Colima, *Gadow* (BM); Tuxpan Cañon, *Orcutt* 4690 pro parte (W). Michoacan: Cerro Azul, near Morelia, *Arsène* 3375 (BM); slopes of Jorullo Volcano, *Eggler* 144 (BM); walls, Yácatas, Iguatio, *Seler* 1232 (ex Loesen.). Mexico: Near Tlalpam, *Pringle* 9282 (NY), *Rose & Painter* 6455 (NY), *Orcutt* 3626 (BM); near Mexico, *Schmitz* (K); Valle de México, *Schaffner* 934 (NY); San Angel, *Schaffner* 13 (BM; NY); Luvianos, Distr. Temascaltepec, *Hinton* 3974 (BM). Morelos: Cuernavaca, *Gadow* (BM); Xochicalco, Distr. Cuernavaca, *Seler* 384 (ex Hieron.). Guerrero: Rio Balsas, *Lautrappe* (NY), *Orcutt* 4230 (BM); Cañon de la Mano, Iguala, *Gadow* (BM); summit of mountains between Chilpancingo and Tixtla, c. 1,830 m., *Moore* 5245 (BM); below Tierra Colorado on highway to Acapulco, 215 m., on shaded rocks, *Moore* 5267 (BM); granitic soil between Acahuizotla and Agua de Obispo, moist rocks in stream, c. 900 m., *Moore* 5114 (BM); on wet, shaded lime rocks, between Santa Ana and Chapulhuacán, 1,160 m., *Moore* 5080 (BM). Oaxaca: Sierra San Pedro Nolasco, *Jürgensen* (BM); between San Juanito and Trinidad, 440 m., *Mexia* 9295a (BM); on rocks, Arroyo Culebras, Yaveo, District Choapam, 450 m., *Mexia* 9190 (BM). Chiapas: *Ghiesbreght* 608 (BM); Cascada Siltepec, *Matuda* 1727 (W); Siltepec, *Matuda* 229 (W).

BRITISH HONDURAS. Soil pockets on granite, banks of Rio Frio, Mountain Pine Ridge, El Cayo Distr., *Lundell* 6700 (W).

GUATEMALA. Without exact locality, *Tonduz* 686 (BM; NY), 752 (BM; NY), *Skinner* (K); north of Sebol, 200–300 m., *Steyermark* 45767 (BM); Volcan de Fuego, *Salvin & Godman* 189 (K); near Purula, *Maxon & Hay* 3369 (NY); near S. Rosa and Jalapa, 400–1,000 m., *Lehmann* 1675 (BM); Cerro de Agua Tortuga, near Cubilgüitz, 350–450 m., *Steyermark* 44592 (BM); Dept. Alta Verapaz, *Türckheim II.* 1386 (NY); Tactic, *Türckheim* 8486 (NY), 1,525 m., *Johnson* 992 (BM); Río Cobán, 1,220 m., *Johnson* 664 (BM); Sapoti, *Bernoulli* 257 (K); on dry ridge, SE. of Pueblo San Jorge, Dept. Solalá, *Hatch & Wilson* 309 (W); near Nupaxlac, Dept. Huehuetenango, 2,500 m., *Steyermark* 48951 (BM); Río Sitio Nuevo, 1,200–1,500 m., Dept. Zacapa, *Steyermark* 42201 (BM), 42202 (BM); SW. of Lanquín, 600–1,000 m., *Steyermark* 44135 (BM); on rocks, near San Mateo Ixtatán, Sierra de los Cuchumatanes, 3,100 m., *Steyermark* 49890 (BM); on rocks by stream, Cuilco, 1,200–1,300 m., *Steyermark* 50888 (BM); rocky slopes above San Ildefonso Ixtahuacán, 1,600–1,700 m., *Steyermark* 50661 (BM); Volcán Santa Clara, Dept. Suchitepéquez, 1,250–2,650 m., *Steyermark* 46595 (BM); Volcán Atitlán, 1,700–3,800 m., Dept. Solalá, *Steyermark* 47428 (BM); between Cobán and Finca Chimoté, 800–1,500 m., *Steyermark* 44174 (BM); near Finca Piamonte, Dept. El Progreso, 2,400–2,500 m., *Steyermark* 43407 (BM); between Calera and Volcán Siglo, 2,000–2,200 m., *Steyermark* 42994 (BM).

SALVADOR. Near Tonacatepeque, Dept. San Salvador, *Standley* 19510 (NY); San Salvador, *Calderón* 186 (NY), 937 (NY), 1740 (NY), *Standley* 19191 (NY), 23277 (NY); Dept. Santa Ana, *Calderón* 1924 (NY); near San Vicente, Dept. San Vicente, *Standley* 21197 (NY); Cuscatancingo, *Calderón* 911 (NY).



HONDURAS. On dripping cliff in pine forest, near Siguatepeque, Dept. Comayagua, 1,100 m., *Yuncker, Dawson & Youse* 5697 (W), 1,050 m., 5719 (BM; W), 5572 (W), 5722 (BM; W); Dept. of El Paraiso, 3 km. west of Guinopé, 1,400 m., *Williams & Molina* 10310 (BM).

NICARAGUA. Santiago Volcano, near Masaya, 300–480 m., *Maxon* 7657 (BM; W), 7668 (W); Laguna de Masaya and vicinity, about 300 m., *Maxon* 7748 (W); shaded rocks of stream bed in ravine, Punta Chiltepe, Tamagasta Terr., west of Managua *Maxon, Harvey & Valentine* 7332 (W).

COSTA RICA. Guanacaste, *Rowlee* 129 (NY); forests of Nicoya, *Tonduz* 13762 (BM); banks of Rio Torres, *Tonduz* 1297 (BM); Cartago, Prov. Cartago, *Cooper* 6061 (NY), *Maxon* 31 (NY), 35 (NY), 1,295 m., *Donnell Smith* 5102 (K); Dulce Nombre, Prov. Cartago, 1,400 m., *Standley* 35886 (W); near Santiago, *Maxon* 93 (NY), 94 (NY); S. José, 1,400 m., *Brade* (ed. Rosenstock) 73 (BM); Cerro de Piedra Blanco, above Escasu, Prov. S. José, *Standley* 32439 (W).

PANAMA. Chiriqui Volcano, *Seemann* 1558 (BM); near El Boquete, Chiriqui, 1,000–1,500 m., *Cornman* 830 (W), 1152 (W), 1346 (W); forests of Cerro de Lino, above El Boquete, 1,300–1,560 m., *Pittier* 3030 (NY; W); valley of the upper Rio Chiriquí, Viejo, near Monte Lirio, 1,300–1,900 m., *Seibert* 311 (W); Campana Hill, 800 m., rocks at summit, *Alston* 8927 (BM).

Geographical range: northern Mexico, southwards to northern Colombia and Venezuela. Also recorded from Surinam by Hieronymus (*Hedwigia* lviii: 286 (1917)).

The records for Cuba and Jamaica by Hieronymus (loc. cit.) appear to be due to confusion with *S. microdendron* and *S. convoluta*. *S. cuspidata* (Link) Link was described from specimens cultivated in the Berlin Botanical Garden. *S. emmeliana* v. Geert was also from a cultivated specimen, named after Mr. Emmel of Nuremberg: it was found wild by his brother in 'Quinquina woods in S. America': it appears as *S. Emiliana* in Bull's Catalogue no. 225 (1886). *S. incana* Spring was described from specimens from Guatemala (*Skinner*), and *S. sulcangula* Spring from Caracas (*Plée*). Spring does not compare them directly with his *S. cuspidata*, which is put under 'A. *Foliis atque ramulis convolutis*', while the other species are under 'B. *Foliis atque ramis siccitate planis*'. *S. sulcangula* is, however, described as '*siccitate subconvolvenda*', and there appears to be a wide range of variation in this respect which is related to the humidity of the habitat of the individual specimen.

*S. microdendron* Bak. is easily confused with this species.

forma **aurea** (J. Hill) Alston comb. nov.

*Selaginella emiliana* var. *aurea* J. Hill in Gard. Chron., ser. 3, xlv: 253 (1908).—in Journ. R.H.S. xxxiv: ccxxxv (1909).

A golden-green form known in cultivation.

6. ***Selaginella umbrosa*** Lemaire ex Hieron. in Engl. & Prantl, Nat. Pflanzenfam. i, 4: 683, fig. 404 (1901); in *Hedwigia* lviii: 287 (1917).—Lundell, Veg. Peten: 195 (1937).

*Selaginella lemairei* Hieron. in *Hedwigia* lviii: 287 (1917), nom. provis.

*Lycopodium umbrosum* Lemaire ex Kunze in *Linnaea* xxiii: 292 (1850) in syn.

*Selaginella erythropus* var. *major* Spring in Mém. Acad. R. Belg. xxiv: 156 (1850).

*Selaginella erythropus* sensu Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 705 (1886); non Spring.—Donn. Smith, Enum. Pl. Guat. ii: 92 (1891).—Mills. in Publ. 279, Field Mus. Nat. Hist., Bot. Ser. iii, 3: 197 (1930).

MEXICO. Yucatan: *Gaumer* 23171 (ex Millsp.).

BRITISH HONDURAS. *Record* (BM; W), *Morris* (K); Roaring Creek, *Lundell* 395 (BM; NY; W); Stann Creek, *Schipp* 51 (BM; NY); Big Creek, *Schipp* 51 (W); Melinda, *Robertson* 144 (BM); Red Cliff, *Robertson* 245 (BM); Stann Creek District, *Stocker* 1929 (W); Gracie Rock, Sibun R., *Gentle* 1552 (W); Cohune Ridge, Single Hill Creek, Mantee R., *Bartlett* 11322 (W).

GUATEMALA. *Skinner* (type of var. *major* Spring, K); near Quirigua, Dept. Izabal, *Standley* 22460 (NY; W), 23748 (NY; W); Quebradas, Dept. Izabal, *Pittier* 8583 (NY; W); Los Amates, Dept. Izabal, *Kellerman* 7250 (NY); Sierra de Mica, *Bernoulli* 165 (K); near Escoba, Dept. Izabal, *Standley* 24839 (NY; W); Jocóló, 30 m., on banks, Dept. Izabal, *Johnson* 988 (BM); Monte Cachirulo, Dept. Izabal, 275 m., *Donnell Smith* 1574 (K; W); shady bank, Cerro de Las Minas, Los Amates to Izabal, Dept. Izabal, *Blake* 7808 (W); lowland jungle, Rio Dulce, *Muenschner* 12171 (W); Quirigua, Dept. Izabal, *Cockerell* (W); near Escoba, on bay opposite Puerto Barrios, Dept. Izabal, 150 m., *Standley* 24840 (W); along Rio Frio, Dept. Izabal, 50–75 m., *Steyermark* 39947 (BM), 41629 (BM); along Rio Santa Isabel, Dept. Petén, 100 m., *Steyermark* 45828 (BM); Izabal, *Salvin & Godman* (K), *Bernoulli & Cario* 164 (K), Hacienda El Limon to El Paraiso, Dept. Copan, *Blake* 7358 (W); trail to El Limon, *Blake* 7339 (W); on rocks, Hac. El Limon, *Blake* 7346 (W).

HONDURAS. Puerto Serra, *Wilson* 91 (NY), 217 (NY); near Lancetilla, *Yuncker* 4952 (BM); Cuyamel, *Carleton* 596 (W); very common on hills, Lancetilla Valley, *Chickering* 20 (W); Tela, on bank of Colorado R., 30 m., in sandy clay, *Dyer A.* 233 (W); Lancetilla, near Tela, *Ames* 55 (W), 178 (W), *Standley* 52755 (W), 54595 (W).

COSTA RICA. Livingston, *Rowlee* 33 (NY; W); Siquirres, near sea-level, *Wercklé* 596 (W); wet forest, Finca Montecristo, on the Rio Reventazón below Cairo, Prov. Limon, near sea-level, *Standley & Valerio* 48602 (W).

PANAMA. Near Laguna de Chiriquí, *Hart* 11 (K; W); along Chavavé R., above Chepo, Prov. Panama, near sea-level, *Pittier* 4720 (W); between Colon and Empire, *Crawford* 536 (BM; NY; W); forest along the Rio Indio de Gatun, Canal Zone, near sea-level, *Maxon* 4820 (BM; W); forests around Porto Bello, Prov. Colon, near sea-level, *Pittier* 2489 (W); along Rio Fató, Prov. Colon, *Pittier* 3885 (W); around Dos Bocas, Rio Fató valley, Prov. Colon, near sea-level, *Pittier* 4220 (W).

Geographical range: Yucatan and British Honduras to Panama and Colombia (*Schlim* 660 and *Kalbreyer* 99).

It seems possible that this is only an introduced plant in Tobago and Barbados; it is common in cultivation.

*S. erythropus* (Mart.) Spring is a smaller species found in Brazil and along the Andes from Peru to Colombia.

## 7. *Selaginella haematodes* (Kunze) Spring in Mart., Fl. Brasil. i, 2: 126 (1840).

*Lycopodium haematodes* Kunze in Linnaea ix: 9 (1835); Farrnkr. ii: 61, t. 30 [excl. fig. C] (1840–7).



PANAMA. *Herb. Miller* (BM), *Hayes* 72 (NY); Gatun, *Hayes* 41 (BM); Frijoles, Canal Zone, *Cook & Martin* 54 (W); Barro Colorado I, *Bailey* 416 (W), *Kenoyer* 62 (W), *Standley* 40957 (W); Cana, 1,065 m., *Williams* 895 (NY); near Cana, 600 m., *Goldman* 1885 (W); forests around Porto Bello, Prov. Colon, near sea-level, *Maxon* 5740 (BM; W), 5750a (BM; W), 5760 (W); El Valle de Anton, Prov. Coclé, in forest, 1,000 m., *Alston* 8739 (BM); foothills of Garajará, Sambú basin, S. Darien, near sea-level, *Pittier* 5595 (W); near Arenosa, lower Rio Trinidad, near sea-level, *Seibert* 611 (W).

Geographical range: Panama southwards to Bolivia.

8. *Selaginella hoffmannii* Hieron. in *Hedwigia* xli: 184 (1902).—Donn. Smith, *Enum. Pl. Guat.* vii: 65 (1905).—Conzatti, *Fl. Tax. Mex.* i: 140 (1946).

*Selaginella undulata* Liebm. ex Fourn., *Mex. Pl.*: 148 (1872), *nom. nud.*

*Selaginella weberi* A. Braun ex Fourn., *Mex. Pl.*: 149 (1872), *nom. nud.*

*Selaginella stellata* sensu Fourn., *Mex. Pl.*: 148 (1872); non Spring.

*Selaginella puberula* sensu Hemsl. in *Godman & Salvin*, *Biol. C.-Amer.* iii: 708 (1886); non Kl.

*Selaginella flabellata* sensu Hemsl. in *Godman & Salvin*, *Biol. C.-Amer.* iii: 706 (1886) pro parte; non Spring.—Donn. Smith, *Enum. Pl. Guat.* i: 68 (1889).—Conzatti, *Fl. Tax. Mex.* i: 143 (1946).

*Selaginella viticulosa* sensu Donn. Smith, *Enum. Pl. Guat.* iv: 180 (1895), vi: 67 (1903); non Kl.

MEXICO. Vera Cruz: Misantla, *Purpus* 5938 (BM; NY; W); Cordoba, *Bourgeau* 1655 (K), 1655 bis (K), *Carruthers* (BM), *Finck* 87 (W), *Müller* 2203 (NY); Cordoba, 825 m., *Seaton* 397 (NY; W); Yeocatlá, near Colipa, *Liebmann* 2075 (H); Hacienda de Mirador, *Liebmann* 2046 (H), 2050 (H); Mirador, *Purpus* 16248 (W); Orizaba, on trees, *Mohr* (W); Tenampa, 900 m., Zacuapan, *J. Purpus* 121 (W); 122 (W); *Purpus* 5938 (BM), 6437 (BM; W). Colima: Alzado, *Orcutt* 4640 (W). Guerrero: El Calabazal, near Zihuateneo, *Langlassé* 454 (K; W); La Puerta, *Langlassé* 421 (K); south of Chilpancingo, *Paxson, Webster & Barkley* 17.M792 (BM); base of cliff, Barranca de la Guacamaya, 490 m., *Mexia* 8860 (BM). Oaxaca: Cueva de Teutila, 900 m., Distr. Cuicatlán, *Conzatti & Gómez* 3520 (W). Chiapas: *Ghiesbreght* 606 (BM); San Bartolo, *Rovirosa* 869 (NY); Finca Irlanda, *Purpus* 7220 (W), 7222 (W).

GUATEMALA. Between Finca San Rafael and Amelco, 400–500 m., *Steyermark* 49565 (BM); Mazatenango, *Bernoulli* 38 (NY), *Bernoulli & Cario* 150 (K); Cubilquitz, Dept. Alta Verapaz, *Türckheim* 8652 (K; W); Rio Frio, 1,200 m., *Johnston* 739 (W), 755 (BM; W); Rio Cobán, 1,220 m., *Johnson* 665 (W), 666 (BM; W), 667 (BM; W); Coban, Dept. Alta Verapaz, 1,300 m., *Türckheim* 701 (W); Rio Xibanas, Finca San José Nil, Retalhuleu, on wet rock, *Hatch & Wilson* 401 (BM).

SALVADOR. Ahuachapan, Dept. Ahuachapan, *Standley* 19757 (NY; W); La Cebadilla, *Calderón* 1204 (BM; NY).

HONDURAS. Rio Bermejo, Dept. Santa Barbara, *Thieme* 5700 (NY; W); San Pedro Sula, 300 m., *Thieme* 5700B (W); Ceiba, *Dyer* A. 159 (W); on rotten log, slopes of Mt. Congrejal, in deep forest, 305 m., *Yuncker, Koepfer & Wagner* 8783 (K); near San Francisco, Dept. Morazán, 850 m., *Williams & Molina* 15916 (BM); along Rio Lindo, north of Lake Yojoa, Dept. Cortés, 500–600 m., *Morton* 7844 (W).

NICARAGUA. Forest, Sierra west of Jinotega, Dept. Jinotega, 1,050–1,350 m.,

*Standley 10269* (T); Cerro de la Cruz, Dept. Jinotega, 1,200–1,400 m., *Standley 10983* (T).

COSTA RICA. Near Aguacate, *Hoffmann 905, 905a, 909* (syn-types, ex. Hieron.); El Brasil, 900 m., *Valerio 21* (W).

Geographical range: eastern Mexico southwards to Costa Rica.

The affinity of the species seems to be with *S. radiata* (Aubl.) Spring from Guiana and *S. versicolor* Spring from W. Africa.

9. ***Selaginella bombycina*** Spring in Mém. Acad. R. Belg. xxiv: 191 (1850).

COSTA RICA. Near Guápiles, Prov. Limon, 300–500 m., in wet forest, *Standley 37269* (W), *37086* (W); Carillo, 400 m., *Brade 840* (BD; frag. BM).

PANAMA. Hills above Campana, 600–800 m., *Allen 1885* (BM); forest, El Valle de Anton, Prov. Coclé, 1,000 m., *Alston 8773* (BM).

Geographical range: Ecuador and Peru.

Nearest to *S. sprucei* A. Braun (non Hook.), from which it is separated by its aristate median leaves, shorter and less branched habit, and less obtuse lateral leaves. From *S. speciosa* A. Braun it is separated by the closely ciliate lateral leaves.

10. ***Selaginella anceps*** Presl in Abh. Böhm. Ges. ser. 5, iii: 581 (1844).

*Lycopodium gracile* Desv. ex Poir. in Encycl. Méth., Bot. Suppl. iii: 551 (1814).

*Lycopodium anceps* Presl, Rel. Haenk. i: 80 (1825).

*Selaginella flabellata* sensu Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 706 (1886) pro parte; non Spring.—Donn. Smith, Enum. Pl. Guat. v: 102 (1899).—Christ in Pittier, Primit.

Fl. Costaric. iii, 1: 61 (1901).—Hieron. in Engl., Bot. Jahrb. xxxiv: 579 (1905).

*Selaginella oaxacana* sensu Donn. Smith, Enum. Pl. Guat. iv: 180 (1895); non Spring.

*Selaginella hartwegiana* sensu Christ in Pittier, Primit. Fl. Costaric. iii, 1: 61 (1901); non Spring.

*Selaginella pulcherrima* sensu Christ in Pittier, tom. cit.: 62 (1901); non Liebm.

*Selaginella gracilis* (Desv.) Hieron. in Hedwigia lviii: 292 (1917); non Moore (1886).

COSTA RICA. Rio Naranjo, 200–250 m., *Tonduz 7643* (W); Hacienda Parismina Banana Co., *Jimenez 1043* (W); La Palma, 1,500 m., *Valerio 5* (W); La Hondura, Prov. of S. José, 1,400 m., *Valerio 11* (W), *Standley 36120* (W); Siquerres, common along drainage ditches, *Stork 2265* (W); Buena Vista, road to San Carlos Valley, 600 m., *Cook & Doyle 120* (W); Rio Hondo, Llanos de S. Clara, 100 m., *Cook & Doyle 505* (W), *570* (W), *571* (W); Cerro Turubales, *Brade 478* (NY); Llanuras de San Carlos, *Brade 838* (NY); Juan Vinas, *Rowlee & Stork 817* (NY; W); Suerre, Llanuras de Santa Clara, 300 m., *Donnell Smith 6946* (K; NY; W); near Guapiles, Prov. Limon, 300–500 m., *Standley 37037* (W); La Colombiana Farm, Prov. Limon, 70 m., *Standley 36825* (W), *36841* (W); Jiménez, Llanos de Santa Clara, Comarca de Limón, *Donnell Smith 5105* (NY); Las Delicias, Santa Clara, 560 m., *Biolley 10662* (W); Port Limon, *Kuntze 2007* (NY); forests of Tsâki, Talamanca, 200 m., *Tonduz 9491* (W); near Angostura, *Polakowsky 446A* (BM); Pirris, *Biolley 49* (P), *17402* (W); near El General, Prov. San José, 575 m., *Skutch 2543* (W), *4061* (BM); San José, Prov. San José, 1,100 m., *Tonduz ed. J.D.S. 7316* (K; W); forests of Tuis, 650 m., *Tonduz 11343* (W).

PANAMA. *Cuming 1266* (BM), *Bridges* (K); Daytona Farm, Almirante, Prov. Bocas del Toro, *Cooper 140* (BM; NY; W); Rubber Tire Station, Western Panama, *Stork*



122 (W); Veraguas, *Bridges* (K); El Valle de Anton, 600 m., on steep shaded banks of Rio Anton, Prov. Coclé, *Allen* 2767 (BM), 1,000 m., *Alston* 8696 (BM); forests on dry limestone, near Alhajuela, Chagres Valley, Prov. Panama, 30–100 m., *Pittier* 5718 (W).

Geographical range: Costa Rica southwards to Bolivia.

Mixed with *Standley* 36825 is an apparently diseased form similar to the form described as *S. crassinervia* (Desv.) Spring, i.e. with small leaves and swollen midribs.

11. ***Selaginella oaxacana*** Spring in Mem. Acad. R. Belg. xxiv: 177 (1850).—F. W. Hall, Cat. Ferns Chiapas: 9 (1873). —Donn. Smith, Enum. Pl. Guat. i: 68 (1889).—Conzatti, Fl. Tax. Mex. i: 142 (1946).

*Lycopodium flabellatum* var. *strictum* Mart. & Gal. in Mém. Acad. R. Brux. xv: 12 (1842).

*Selaginella guatemalensis* sensu Donn. Smith, Enum. Pl. Guat. i: 68 (1889); non Bak.

*Selaginella flabellata* sensu Donn. Smith, Enum. Pl. Guat. ii: 92 (1891), vii: 65 (1905); non Spring.

*Selaginella wendlandii* Hieron. in Engl. & Prantl, Nat. Pflanzenfam. i, 4: 683 (1901); in Hedwigia xli: 186 (1902).

? *Selaginella costaricensis* Hieron. locis cit.: 683 & 188.

*Selaginella anceps* sensu Christ in Pittier, Primit. Fl. Costaric. iii, 1: 61 (1901) pro parte; non A. Braun.

MEXICO. Oaxaca: Chinantla, *Galeotti* 6608 bis (photo BM; P), 6608 (Br.); Mt. Cuitcatlan, 1,000 m., *Gonzalez & Conzatti* 734 (W); near Lacoba, Distr. Chinantla, *Liebmann* 2051 (H). Chiapas: *Ghiesbreght* 602 (BM; K); San Bartolo, *Rovirosa* 868 (NY); S. Cristobal, *Munch* 54 (P).

GUATEMALA. Near Esperanza, *Maxon & Hay* 3350 (NY); Santa Cruz Almor-Ixoan, Dept. Huehuetenango, *Bernoulli* (K); Pansamalá, Dept. Alta Verapaz, *Türkheim* 653 (W), 679 (BM; NY; W), *Donnell Smith* 1577 (K; W); Finca Mocca, 975 m., *Johnson* 105 (NY; W); between Sepacuité and Secanquim, 1,000 m., *Pittier* 316 (NY; W), 350 m., *Maxon & Hay* 3118 (W); near Finca Sepacuite, *Cook & Griggs* 62 (W), 89 (W); Quebradas Secas, 750 m., *Johnson* 948 (BM; W); Río Cobán, 1,200 m., *Johnson* 670 (BM; W); Finca Seamay, Senahu, Alta Vera Paz, 920 m., *Barton* 35 pro parte (BM); mountains above Trece Aguas, 920 m., *Cook & Doyle* 7b (W); Cubilquitz, 350 m., *Türkheim* 8485 (W); between Ixcán and Finca San Rafael, Sierra de los Cuchumatanes, 200–800 m., *Steyermark* 49418 (BM), 1,200–2,000 m., 49157 (BM); Río Ixcóla, near Finca Cubilquitz, 300–350 m., *Steyermark* 44745 (BM).

HONDURAS. Lancetilla Valley, near Tela, Dept. Atlántida, 20–600 m., *Standley* 56791 (W); slopes of Mt. Cangrejal, 305 m., *Yuncker, Koepfer & Wagner* 8820 (St.).

COSTA RICA. *Wercklé* (BM); La Gloria de Juan Viñas, *Pittier* 3661 (NY; W); Juan Viñas, *Brade* 479 (NY); Las Vueltas-Turrique, *Tonduz* (K), 13349 (W, type-collection of *S. costaricensis*); Turrialba, *Maxon* 153 (NY; W); San Miguel, *Wendland* 771 (V, type-collection of *S. wendlandii*); Bonilla, *Ridgway* (W); Buena Vista, road to San Carlos Valley, 600 m., *Cook & Doyle* 130 (W); La Hondura, Prov. S. José, 1,300–1,700 m., *Valerio* 2 (W), *Standley* 36200 (W), 36278 (W), 37776 (W), 37810 (W), 37876 (W); vicinity of La Palma, on the road to La Hondura, 1,500–1,700 m., *Maxon & Harvey* 8001 (W); forests of La Palma, 1,459 m., *Tonduz* 12584 (W), 1,500 m., *Valerio* 13 (W), 1,600 m., *Standley* 38142 (W), 38178 (W), 38217 (W),

*Rowlee* 217 (W), *Stork* 447 (W); woods of Carara Puriscal, 400 m., *Jimenez* 829 (W); Vara Blanca de Sarapiquí, between Poás and Barba, 1,250 m., *Skutch* 3494 (St.), 3632 (St.); Pirris, 20 m., *Biolley fil.* 17401 *pro parte* (W); vicinity of Pejivalle, Prov. Cartago, 900 m., *Standley* 46868 (W), 46962 (W), 47006 (W); forests of Cabagra, *Tonduz* 6551 (W); forests of Rio Ceibo at Buenos Aires, *Tonduz* 4857 (W).

PANAMA. On ground in forest, El Valle de Anton, Prov. Coclé, 1,000 m., *Alston* 8691 (BM).

Geographical range: Oaxaca southwards to Panama.

Similar plants (e.g. *Archer* 1974) have been found in Colombia, but require further study. The Costa Rican specimens usually have larger leaves, but I cannot find any character by which they can be separated specifically.

12. ***Selaginella microdendron*** Bak. in Journ. of Bot. xxiii: 116 (1885).

*Selaginella sulcangula* Spring in Mém. Acad. R. Belg. xxiv: 163 (1850) *pro parte* excl. planta Venezuelana; non Spring (1843).

*Selaginella pulcherrima* sensu Fourn., Mex. Pl.: 147 (1872) *pro parte*; non Liebm.

*Selaginella harrisii* Underw. ex Urban in Symb. Antill. vii: 162 (1912).

*Selaginella millsaughii* Hieron. in Hedwigia lviii: 285 (1917).

*Selaginella enckeii* Nessel in Fedde, Repert. Sp. Nov. xlviii: 172 (1940).

MEXICO. Tamaulipas: Near Gómez Farias, 350 m., *Palmer* 301 (NY). Vera Cruz: Potrero Viejo, 700 m., in tufts in shade on limestone ridges, *Copeland* 171 (BM); banks of Rio Blanco, Orizaba, *Bourgeau* 2540 (BM); Cordoba, *Finck* 133 *pro parte* (K). Yucatan: near Chichen Itzá, *Millsaugh* 1620 (type-collection *S. millsaughii*, BM); in forest near Pisté, Chichen Itzá, *Steere* 1365 (BM); under log-wood trees, near Cape Catoche, *Baqueiro* (ex Nessel, type of *S. enckeii* Nessel).

BRITISH HONDURAS. Big Creek, edge of stream, *Schipp* 99 (BM).

GUATEMALA. Finca Seamay, Senahu, Alta Vera Paz, 915 m., *Barton* 29 (BM).

Geographical range: also in Cuba and Jamaica.

This species has been confused with *S. pallescens* (*cuspidata*), but may be separated by the ovate-triangular (not ovate-lanceolate) outline of the shoot-system, usually branching above (not below) the middle. The old dead leaves are light reddish-brown (not pale buff), the leaves dull green (not silvery) below, and the lateral leaves acuminate (not aristate).

*S. pulcherrima* Liebm. is similar in habit, but its median leaves have only a narrow white margin.

The Cuban plant is still very imperfectly known, and more material is desirable. Hieronymus attempts to separate *S. millsaughii* from the Jamaican plant (*S. harrisii*) by its very short 'rhizome' and consequently contracted branch-system, with lateral leaves somewhat less broad and with rather longer cilia in the lower part of both sides.

*S. enckeii* I know from description only, but have little doubt that it represents this species.

13. ***Selaginella pulcherrima*** Liebm. ex Fourn., Mex. Pl. 147 (1872).—Bak. in Journ. of Bot. xxiii: 117 (1885).—Alston in Journ. of Bot. lxxi: 242 (1933).—Conzatti, Fl. Tax. Mex. i: 140 (1946).

*Selaginella amoena* Bull. Retail List Pl. no. 199: 16 (1884).—Dyer in Bull. Misc. Inf. Kew, Add. Ser. 4: 364 (1900).



MEXICO. Vera Cruz: wooded slopes near Hacienda de Jovo, *Liebmann* 2061 (H, type; BM), s.n. (BM; K; W); Canton de Huatusco, 1,200 m., *Conzatti* 807 (W).

Geographical range: confined to a small area in Vera Cruz, but widely cultivated in botanic gardens.

There is a specimen of *S. amoena* at Kew labelled by Thomas Moore 'Bull. Nov. 1881—Mexico 3244'.

I cannot find Fournier's reference to Liebmann (Udsigt over Lycopodiaceernes Forhold i Mexico, in Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjobenhavn, 1847), but his brief description 'Haec species tantum pro varietate altiori praecedentis verisimiliter habenda est, consentiente cl. Spring in litt.' appears to validate the name.

14. *Selaginella illecebrosa* Alston, sp. nov. (Plate 5).

Species heterophylla ex affinitate *S. flabellatae*; caulibus c basi breviter repente erectis, 23–50 cm. altis, 1.55–2.25 mm. in diam.; parte inferiore simplice 9–10 cm. longe, siccitate pallide straminea sulcata, foliis homomorphis subdistantibus tecta, rhizophoris basi restrictis; parte frondosa ambitu ovato-pentagona, tripinnata; ramis alternatis, internodis c. 1.5 cm. longis; foliis caulium ovato-ellipticis, basi ciliatis; foliis lateralibus partis frondosae leviter imbricatis, oblique oblongis, c. 5 mm. longis, 2 mm. latis, pagina superiore obscuriore; semi-facie superiore semi-lanceolata, basi rotundata ciliata parte superiore serrulata; semi-facie inferiore semi-oblonga, integra, basi ciliis nonnullis instructo excepta; foliis axillaribus oblongo-lanceolatis basi ciliatis; foliis intermediis semi-orbicularo-reniformibus margine exteriori minute serrulata interiori integra, apice breviter aristata ex-auriculatis; strobilis ad marginem partis frondosis in apicibus ramulorum instructis tetragonis c. 5 mm. longis, 1 mm. latis; sporophyllis ovato-deltoides carinatis serrulatis subacutis; megasporis circa 200  $\mu$  crassis, albido-griseis (in sicco), pallide flavis (humectis) triradiatis irregulariter sed crebre reticulato-rugosis; microsporibus acervatim congregatis pallide miniatis, singulis pallide luteis, circa 25  $\mu$  crassis triradiatis in parte abaxiale papillis brevibus indutis.

MEXICO. Tabasco: Teapa, *Roviroso* 615 (W).

GUATEMALA. Rocky boulders along lower part of stream tributary to Rio Frio, Dept. Izabal, 75–150 m., *Steyermark* 41579 (BM, type).

HONDURAS. Wet forest, common, near Tela, Lancetilla Valley, Dept. Atlántida, 20–600 m., *Standley* 52940 (W), 53320 (W); Hacienda El Limon to El Paraiso, *Blake* 7362 (W).

Geographical range: southern Mexico to Honduras.

15. *Selaginella californica* Spring in Mém. Acad. R. Belg. xxiv: 98 (1850).—Watson, Bot. Calif. ii: 350 (1880).—Hieron. in Engl. & Prantl, Nat. Pflanzenfam. i, 4: 678 (1901).

'CALIFORNIA'. *Deppe* (P, dupl. of type).

Geographical range: known only from the type-collection.

Deppe's Californian travels were mainly in Lower California, where he visited Cape S. Lucas, La Paz, and Loreto. S. Watson thought that this species came from

there, but it does not seem a likely habitat for this plant and it may have been from the State of Vera Cruz. Deppe went to Mexico in 1828 with Schiede and collected about Jalapa, Orizaba, Papantla, and Misantla.

Some plants labelled 'California, *Deppe*' in the Berlin Herbarium came from Hawaii, for example specimens of *Asplenium kaulfussii* Schlechtend. As I can find no character to distinguish *S. californica* from the Hawaiian *S. arbuscula* (Kaulf.) Spring, it seems possible that the specimen came from Hawaii.

16. ***Selaginella mosorongensis*** Hieron. in Hedwigia xliii: 4 (1904).

MEXICO. Vera Cruz: Motzorongo, between Tierra Blanca and Córdoba, *Schumann* 1905 (P, type-collection; photo BM).

Geographical range: known only from the type-collection from Vera Cruz.

17. ***Selaginella viticulosa*** Klot. in Linnaea xviii: 524 (1844).

*Selaginella menziesii* sensu J. Sm. in Seem., Bot. Herald: 243 (1852-7); non Spring.

COSTA RICA. Río Naranjo, *Jimenez* (BM; W).

PANAMA. Santiago de Veraguas, growing on rocks, *Seemann* 281 (BM); hills west of Soná, 500 m., Prov. Veraguas, *Allen* 1047 (BM).

Geographical range: Venezuela. Also as an escape in Brazil, Trinidad and Bermuda.

18. ***Selaginella schaffneri*** Hieron. in Engl. & Prantl, Pflanzenfam. i, 4: 674 (1901); in Hedwigia xli: 172 (1902).—Davis, Life of Pringle: 332, 508 (1938).

*Selaginella saccharata* sensu Eaton in Proc. Amer. Acad. Art. Sci. xviii: 189 (1883).—Davis, Life of Pringle: 71, 652 (1936); non A. Braun.

MEXICO. San Luis Potosi: San Rafael Mts., *Schaffner* 8 (type-collection, BM, NY); *Schaffner* 936 (NY). Jalisco: Bluffs of the barranca near Guadalajara, cool ledges and banks, *Pringle* 2594 (BM; W); near Guadalajara, face of cliffs, *Pringle* 2040 (BM; NY), 15630 (W). Mexico: Bejucos, district of Temascaltepec, *Hinton* 7391 (BM; W).

Geographical range: restricted to the Central Mexican Plateau.

The uniform leaves of the prostrate main stem are an unusual character, but are not always clearly visible when only the tops of lateral branches are collected. The rhizophores are sometimes conspicuous and regularly dichotomous.

19. ***Selaginella lindenii*** Spring in Bull. Acad. Brux. x: 142 (1843).—Fourn., Mex. Pl.: 148 (1872).—Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 707 (1886).—Conzatti, Fl. Tax. Mex. i: 143 (1946).

MEXICO. Tabasco: Teapa, on wet shady rocks, *Linden* (P, type; BM); 1599 (K).

Geographical range: known only from a single locality in Tabasco.

This is, with the exception of *S. porphyrospora* A. Braun and *S. revoluta* Bak., the only species from continental North America with hairs on the upper surface of the leaves, as in the Jamaican *S. hispida* (Willd.) A. Braun ex Urb. (*S. swartzii* Spring), which has, however, ovate (not oblong) leaves. *S. delicatissima* Linden is the Mexican species which comes nearest to *S. lindenii*.

20. ***Selaginella delicatissima*** Linden [Catalogue no. 11: 20 (1856) *nom. nud.*] A. Braun in Index Sem. Hort. Bot. Berol. 1857, App.: 13 (1858?); op. cit.: 24 (1860); Ann.



Sci. Nat. sér. 4, xiii: 60 (1860).—Hieron. in Engl. & Prantl, Nat. Pflanzenfam. i, 4: 689 (1901).

*Selaginella saccharata* A. Braun in Ann. Sc. Nat. sér. 5, iii: 272 (1865).—Triana & Planch., Prodr. Fl. Novo-Granat.: 356 (1867).—Conzatti, Fl. Tax. Mex. i: 142 (1946).

*Selaginella sanguinolenta* Liebm. ex Fourn., Mex. Pl. 148 (1872), in syn.; non (L.) Spring.

*Selaginella purpuripes* Liebm. ex Fourn., loc. cit.

*Selaginella spirillum* Liebm. ex Fourn. loc. cit.—Davis, Life of Pringle: 81 (1936).

*Selaginella feeana* Spring ex Fée, Mém. Fam. Foug. ix: 36 (1857), nom. nud.

*Selaginella saccharata* vars. *major* and *minor* Fourn., Mex. Pl.: 148 (1872).

*Selaginella serpens* sensu Sch. Bip. ex A. Braun, loc. cit., in syn.; non (Desv.) Spring.

MEXICO. Nuevo Leon: Sierra Madre, near Monterey, *Pringle* 1978 (BM; NY; W); sandstone cliff, 'Alamar', Pabillo, SE. of Galeana, 1,650–1,700 m., *Pennell* 17199 (W); Cerro del Viejo, 24 km. west of Dulces Nombres, Municipality of Zaragoza, *Meyer & Rogers* 3049 (BM). Tamaulipas: Cerro Zamora, Sierra de San Carlos, near Milagro, *Bartlett* 11046 (BM; W). San Luis Potosi: *Schaffner* 9 (BM; NY; W); Tamasopo Cañon, *Pringle* 3296 (BM; NY; W); near Los Canos, *Palmer* 266 (NY; W); San Miguel Mts., *Schaffner* (NY). Jalisco: Near Guadalajara, *Pringle* 2634 (NY). Hidalgo: Barranca below Honey Station, *Pringle* 15620½ (W); Atotonilco, *Berlandier* 405 (BM). Vera Cruz: Zacuapan, *Purpus* 2388 (BM; NY; W), 2849 (BM), 6438 (BM; NY; W), 8924 (BM), 14034 (W), 14019 (BM); *J. Purpus* 116 (W); Huatusco, 1,200 m., *Conzatti* 808 (W); Sierra de S. Cristobal, *Sartorius* (syn-type of *S. saccharata* A. Braun, fragm. W); Dos Puentes, between Totilla and Huatusco, *Liebmann* (W); Orizaba, *Bilimek* 484 (BM; K; NY; W), *Müller* 367 (NY), 737 (K; NY), *Mohr* (W), *Mohr & Botteri* (W); Upper Barranca de Tenampa, 900 m., *J. Purpus* 115 (W), 117 (W), 119 (W), 464 (NY; W); Cordoba, *Hahn* 1426 bis (K); rocks in half-shaded places, Fortin, 800–900 m., *J. Purpus* 118 (W); Barranca de Panoya, *Purpus* 8464 (W). Colima: San Marcos, *Jones* 486 (W). Michoacan: Campanario, near Morelia, 2,100 m., *Arsène* 5614 (W), 10678 (W); Cerro Azul, near Morelia, *Arsène* 6025 (BM; W), ed. Ros. 30 (W); Punguato, near Morelia, 1,950 m., *Arsène* 5819 (W); near la Huerta, Morelia, 1,950 m., *Arsène* 5980 (BM; W); Cerro San Miguel, 2,200 m., *Arsène* 5561 (W), 5624 (W); Rincon, near Morelia, 1,900 m., *Arsène* 2663 (W); Jaripeo, 2,100 m., near Morelia, *Arsène* 5989 (W), 6022 (W); S. Maria, near Morelia, *Arsène* (BM). Morelos: Sierra de Tepoxlan, *Rose & Painter* 7250 *pro parte* (W); near El Parque, *Rose & Painter* 7250A (BM). Guerrero: 16 km. north of Chilpancingo, *Frye* 2578 (BM). Oaxaca: Chinantla, *Sallé* (BM); dry rocks near Chinantla, 2,150 m., *Liebmann* 2065 (H).

GUATEMALA. Under bushes, Santa Rosa, 1,600 m., Baja Verapaz, *Türckheim* II. 2180 (W).

Geographical range: confined to Mexico and Guatemala.

*Selaginella delicatissima* Linden was described by A. Braun from specimens in the Berlin Botanic Garden which had been received from Linden in 1856. Williams (Select Ferns: 223 (1868)) gives its origin as Colombia, but there seems to be no justification for this statement. Hieronymus says 'vermutlich aus den Anden Nordamerikas'. It rarely fruits in cultivation, and I have seen no cultivated specimens with fruit; but Hieronymus describes the spores. The dead leaves sometimes take on a reddish tinge, which is characteristic of the species and unusual in the genus.

A. Braun's epithet *saccharata* was given on account of the resemblance of the microspores to ground yellow sugar.

21. ***Selaginella douglasii*** (Hook. & Grev.) Spring in Bull. Acad. Brux. x: 138 (1843); in Mém. Acad. R. Belg. xxiv: 92 (1850).—Piper in Contr. U.S. Nat. Herb. xi: 87 (1906).—A. Tryon in Ann. Miss. Bot. Gard. xxxvi: 422, 36, fig. 28 (1949).

*Lycopodium ovalifolium* Hook & Grev., Ic. Fil.: t. 177 (1829); non Desv.

*Lycopodium douglasii* Hook. & Grev. in Hook. Bot. Misc. ii: 396 (1831); Hooker, Fl. Bor. Amer. ii: 268 (1840).

? *Lycopodium denticulatum* sensu Wilks, Journ. D. Douglas: 145 (1914); non L.

UNITED STATES. Idaho: Rocky cliffs near Deadman Creek, on the Lochsa R., 765 m., *Young* (BM); moist slopes about Selway Falls, Idaho Co., *Aase* 1774 (BM). Washington: Cape Horn, *Howell* 35 (ex Piper), *Piper* 4965 (ex Piper); Kalama, *Hemphill* (K). Oregon: Columbia R., near spring in wood, *Douglas* (K); abundant in moist places on the hills near Grand Rapids, Columbia R., above Vancouver, Sept. 1825, *Douglas* 482 (ex Wilks); banks of the Columbia, *Lobb* (BM); Portland, *Godman* 342 (BM); damp, shady rocks, near Bonneville, *Suksdorf* (BM).

Geographical range: western North America.

Hooker gives the type-locality as 'Northwest coast of America, Douglas', but Spring 'in sylvestribus Columbiae, frequens'. I have extracted information which presumably relates to the type-locality from Douglas's Journal. Northern California and British Columbia are included in the range of this species in most American books, but I have seen no specimens quoted. The locality 'British Columbia' appears in Baker (Handb. Fern-Allies: 48 (1887)) and it seems to have arisen through confusion with the Columbia River. Hooker wrote 'Columbia, Douglas' on the Kew sheet and Baker has added 'British'. Mr. G. A. Hardy could find no specimen in the herbarium of the Provincial Museum at Victoria, B.C., nor any reference to the species in local lists.

I have ascertained by correspondence that there are no specimens from Northern California in the herbaria at the University of California, Dudley Herbarium, Stanford, or U.S. National Herbarium. The suggestion that this species was to be found there seems to have started with S. Watson (Bot. Calif. ii: 350 (1880)) who stated that it was probably in Northern California. In 'The Fern Allies': 160 (1905), Clute wrote 'it is reported to grow in Northern California, Oregon, Washington, and British Columbia', and later authors, starting with Piper (Contrib. U.S. Nat. Herb. xi: 87 (1906)), made the statement positive.

22. ***Selaginella ludoviciana*** A. Braun in Index Sem. Hort. Bot. Berol. 1857, App.: 12 (1858?); 1859, App.: 21 (1860); 1867: 2 (1868).—Correll in Amer. Fern Journ. xxviii: 98 (1938).—M. Broun, Index to N. American Ferns: 157 (1938).

*Selaginella apus* var. *denticulata* Spring in Mém. Acad. R. Belg. xxiv: 77 (1850).

*Lycopodium louisianum* Link ex Courtin, Cult. Farn.: 88 (1855).

? *Selaginella albidula* var. *macrostachya* (A. Braun) Hieron. in Engl. & Prantl, Nat. Pflanzenfam. i, 4: 695 (1901).

? *Selaginella apus* var. *macrostachya* A. Braun ex Hieron., op. cit., in syn.

*Diplostachyum ludovicianum* (A. Braun) Small, Ferns S.E. United States: 422 (1938).

UNITED STATES. Florida: Without locality, *Rugel* (W), *O'Neil* 82 (W), *Bartram* (BM); Chattahoochee, *Chapman* (W); Apalachicola R., *Aspalaga*, *Correll & Kurz* 5675 (W); on dry rocks, *Aspalaga*, *Wherry* (W); Gainesville, *Piper* (W); Chattahoochee R., common at spring, *Bush* 233 (W). Louisiana: Pine woods, *Mandeville*, *Langlois* (W); Covington, *Drummond* (K); Sulphur Spring, Covington, *Arsène* 11648 (W). Alabama: 1832, *Drummond* (K). Texas: (ex Broun).

Geographical range: confined to Alabama, Florida, Louisiana and Texas.

This is a more straggling plant than *S. apoda*, blue-green, with the leaves narrower and of thicker texture. Brown & Correll reduce *S. ludoviciana* to *S. apoda* in their 'Ferns & Fern Allies of Louisiana': 157 (1942).

23. ***Selaginella apoda*** (L.) Morren, Belg. Hort. iv: 70 (1854).—Fernald in *Rhodora* xvii: 68 (1915).

*Lycopodium apodum* L., Sp. Pl.: 1105 (1753).

*Diplostachyum apodum* (L.) Beauv., Prodr.: 107 (1805).

*Lycopodium albidulum* Sw., Syn. Fil.: 183, 409 (1806).

*Selaginella albidula* (Sw.) Spring in *Flora* xxi: 214 (1838).

*Selaginella apus* Spring in Mart., Fl. Bras. i, 2: 119 (1840) pro parte.

*Lycopodioides apodum* (L.) O. Kuntze, Rev. Gen. i: 824 (1891).

*Selaginella* sp.—Davis, Life Pringle: 222, 244, 332, 591, 619 (1936).

MEXICO. Hidalgo: Canales, *Pringle* 8797 (W). Puebla: Honey Station, wet banks, *Pringle* 8797 (NY); banks of brooks, near Honey Station, *Pringle* 10815 (W). Chiapas: S. Cristoval, *Munch* 37 (BM; P).

Geographical range: Canada and eastern United States from Maine to British Columbia southwards to Florida, Louisiana and Texas.

The British Museum has specimens from Ontario, Wisconsin, Connecticut, Virginia, Georgia, Pennsylvania, Florida, Louisiana, N. and S. Carolina, New York, Delaware, Ohio and Illinois. In addition, I have seen specimens in the U.S. National Herbarium from Tennessee, Alabama, Texas, W. Virginia, and Kentucky.

Some specimens from Mexico greatly resemble this species, and are best placed here.

I have not considered the transfer *Selaginella apoda* (L.) Linden (Cat. no. 8: 15 (1853)) as validly made. Morren's is an implied combination with some description: if not accepted as a valid transfer it might be held to invalidate Fernald's combination as a later homonym.

24. ***Selaginella tarapotensis*** Bak. in Journ. of Bot. xxi: 98 (1883).

*Selaginella faucium* Liebm. ex Fourn., Mex. Pl.: 148 (1872) *nom. nud.*—Bak. in Journ. of Bot. xxi: 333 (1883); Handb. Fern-Allies: 58 (1887).—Alston in Journ. of Bot. lxxi: 243 (1933).—Conzatti, Fl. Tax. Mex. i: 143 (1946).

MEXICO. Vera Cruz: Hacienda de Jovo, *Liebmann* (K), 2048 (H); Huitamalco, *Liebmann* (K), 2047 (H); near Consoquitla on rocks, *Liebmann* 2049 (H). Oaxaca: clay banks in dense forest, Santa Maria, *Mexia* 9270a (BM).

GUATEMALA. Near Finca Sepacuite, Alta Verapaz, *Cook & Griggs* 55 pro parte (W), 64 (W).

PANAMA. Near Cana, 920 m. *Williams* 894 (BM; NY).



Geographical range: southwards to Bolivia (*Buchtien 1071*).

This species seems doubtfully distinct from the Brazilian *S. flexuosa* Spring.

25. ***Selaginella ovifolia*** Bak. in Journ. of Bot. xxii: 90 (1884).

BRITISH HONDURAS. Shady creek bank, Big Creek, 30 m. *Schipp 924* (BM; BD); Mountain Pine Ridge, El Cayo District, *Bartlett 11761* (BM), *11921* (BM).

Geographical range: Cuba, Hispaniola, Jamaica, Puerto Rico.

26. ***Selaginella reflexa*** Underw. in Bull. Torr. Bot. Club xxi: 268 (1894).—Davis, Life Pringle: 68, 237, 332, 508, 612 (1936).—Conzatti, Fl. Tax. Mex. i: 142 (1946).

*Selaginella microphylla* sensu Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 708 (1886); non Spring.

*Selaginella carioi* Hieron. in Engl. & Prantl Nat. Pflanzenfam. i, 4: 688 (1901); in Hedwigia xli: 198 (1902).

*Selaginella microphylla* var. *albomarginata* A. Braun ex Hieron. in Hedwigia xli: 200 (1902) in syn.

*Selaginella schiedeana* sensu Davis, Life Pringle: 81, 332, 516 (1936); non A. Braun.

MEXICO. San Luis Potosi: Tamasopo Canyon, *Pringle 3292* (BM; NY; W); Minas de San Rafael, *Purpus 5488* (BM; NY; W). Jalisco: Near Guadalajara, on damp rocks and banks, *Pringle 2635* (BM; NY; W); Barranca de Oblatos, 1,220 m., *Barnes & Land 209* (BM). Guerrero: Iguala Canyon, 920 m., *Pringle 10326* (BM; NY; W); Cañon de la Mano Negra, near Iguala, *Rose, Painter & Rose 9391* (W).

GUATEMALA. Left bank of R. Motagua, between Barbasco and Gualan, *Bernoulli 955* (BM; K; NY; P); banks of R. Chixoy, Alta Verapaz, *Bernoulli & Cario 172* (P); on bare vertical face of limestone bluff, Cerro Chinajá, above source of Rio San Diego, 150–170 m., *Steyermark 45657* (BM); around Salamá, Baja Verapaz, *Cook 271* (BM).

Geographical range: Mexico and Guatemala.

27. ***Selaginella guatemalensis*** Bak. in Journ. of Bot. xxi: 243 (1883) pro parte—

Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 1. 109 (1886).—Donn. Smith, Enum. Pl. Guat. i: 68 (1889) pro parte, ii: 92 (1891), vi: 76 (1903).

*Selaginella lehmanni* Hieron. in Hedwigia xliii: 33 (1904).

*Selaginella pansamalensis* Hieron., tom. cit.: 35 (1904).

MEXICO. Oaxaca: Between Lobani and Petlapa, Distr. Chinantla, *Liebmann 2060* (H).

BRITISH HONDURAS. Capan R., 795 m., *Schipp 8–818* (BM).

GUATEMALA. Near Puxala, Baja Vera Paz, 1,700 m., *Lehmann 1329* (type-no. of *S. lehmannii* Hieron., BM); Senahu, *Maxon & Hay 3297* (NY); Finca Seamay, Senahu, 920 m., *Barton* (BM); Coban, Alta Vera Paz, *Salvin & Godman* (K, type); Pansamala, 1,160 m., among rocks, *Türckheim 653* (P; NY, type-collection of *S. pansamalensis*); between Peten and Samac, near Cobán, 1,400 m., on wet ground, *Türckheim 79* (K; P); near Copan, *Türckheim* (W); Cubilquitz, 350 m., *Türckheim 8360* (W), *8361* (BM; NY; W), *8362* (W), *8363* (W); near summit of Cerro Sillab, Senahu, Alta Verapaz, *Hatch & Wilson 167* (W); Samac, 1,350 m., *Johnson 822* (BM); between Chamá and Cobán, 900 m., *Johnson 824* (BM), 610 m., *Johnson 945* (BM); Quebradas Secas, 765 m., *Johnson 947* (BM); trail between Sepacuité and Secanquin,

550 m., *Maxon & Hay* 3116 (BM; W); Cerro Huitz, Sierra de los Cuchumatanes, Dept. Huehuetenango, 1500–2600 m., *Steyermark* 48671 (BM); Finca Mocca, Alta Verapaz, 1,000 m., *Johnson* 150 (BM); between Finca Chimoté and Finca Cubilguitz, 300–350 m., *Steyermark* 44455 (BM); Cerro Chinajá, between Finca Yalpemech and Chinajá, 150–700 m., *Steyermark* 45683 (BM).

HONDURAS. Near Siguatepeque, Dept. Comayagua, *Standley* 56191 (BM; W); Barranco de Trincheras, near Siguatepeque, Dept. Comayagua, in rain-forest, 4,200 m., *Morton* 7577 (BM); on rocks in spray of water-fall, ravine near El Achote, in hills above the plains of Siguatepeque, 1,350 m., *Yuncker, Dawson & Youse* 5840 (BM); near El Achote, 1,350 m., *Yuncker, Dawson & Youse* 6214 (BM), 1,700 m., 6436 (BM).

Geographical range: southern Mexico southwards to Honduras.

Baker's specimen from Nicaragua was *S. huehuetenangensis* Hieron.

28. ***Selaginella huehuetenangensis*** Hieron. in *Hedwigia* xliii: 32 (1904).

*Selaginella guatemalensis* Bak. in *Journ. of Bot.* xxi: 243 (1883) pro parte.

BRITISH HONDURAS. *Peck* 634 (BM; W); El Cayo District, San Antonio, *Bartlett* 13032 (BM); near Camp 6, El Cayo District, *Gentle* 2362 (BM); Little Mountain Pine Ridge, *Bartlett* 11881 (BM); Copan R., 800 m., Forest Home, Punta Gorda, 61 m., *Schipp* 8–820 (BM; BD.)

GUATEMALA. Gualan, *Bernoulli & Cario* 162 (K); Choctum, *Salvin & Godman* (K); Culpan, near Colomba, *Rodriguez* 289 (P); near Quiriguá, Dept. Izabal, *Standley* 23690 (NY; W), 23908 (NY; W), 24173 (NY; W), 24707 (NY; W); Los Amates, *Kellerman* 7412 (BM; NY), *Blake* 7719 (W); Cerro de las Minas, Los Amates to Izabal, *Blake* 7788 (W), 7796 (W); vicinity of La Libertad, Dept. Petén, *Aguilar* 490 (BM); Monté Santa Teresa, Distr. Petén, *Lundell* 2661 (W), 3883 (W); Carillo, *Cooper* 569 (BD); vicinity of Secanquim, about 550 m., Dept. Alta Verapaz, *Maxon & Hay* 3123 (BM; W); Finca Seamay, Senahu, 920 m., *Barton* (BM); near Finca Sepacuite, *Cook & Griggs* 358 (W); Secanquim, *Cook & Griggs* 271 (W); trail from Panzás to Sepacuité, *Maxon & Hay* 3105 (W); near Secanquim, trail to Cahabon, *Goll* 31 (W); between Chama and Cobán, 610 m., *Johnson* 943 (BM; W), 944 (W); between Ixcán and Finca San Rafael, Sierra de los Cuchumatanes, Dept. Huehuetenango, 200–800 m., *Steyermark* 49406 (BM), 49408 (BM); along Rio Santa Isabel, between mouth of Rio Sebol and El Porvenir, Petén, 100 m., *Steyermark* 45839 (BM); along Rio Frío and tributaries, 75–150 m., Dept. Izabal, *Steyermark* 39979 (BM); Savanna north of Concepción, Alta Verapaz, 100–110 m., *Steyermark* 45273 (BM); crevices of rock, SW. of Lanquín, 600–1,000 m., *Steyermark* 44102 (BM); between Finca Cubilguitz and Hacienda Yaxacabanal, 300 m., Alta Verapaz, *Steyermark* 44826 (BM).

HONDURAS. Near Siguatepeque, Dept. Comayagua, 1,080–1,400 m., *Standley* 55920 (BM; W), 1,050 m., *Yuncker, Dawson & Youse* 5707 (BM; W); Ceiba, 152 m., *Dyer* A. 175 (W).

NICARAGUA. Chontales, *Tate* (K); dense wet forest, near La Libertad, 5–700 m., *Standley* 8806 (T), 9061 (T); Ballange Hills, Bahia de Bluefields, Dept. Zelaya, 0–30 m., *Molina* 1847 (T); on wet rocks in forest, Aberdeen Hills and El Paal, Bahia

de Bluefields, Dept. Zelaya, 0-30 m., *Molina* 2025 (T); near El Recreo, on Río Mico 30 m., *Standley* 19184 (T), 19217 (T), 19400 (T), 20060 (T), 20144 (T.)

COSTA RICA. Llanuros de San Carlos, 500 m., *Brade* 476 (BD), 477 (BD; NY); Cuesta de la Vieja, road to San Carlos, 300 m., *Cook & Doyle* 112 (W).

PANAMA. Forests around Porto Bello, Prov. Colon, 5-200 m., *Maxon* 5753 (BM).  
Geographical range: British Honduras to Panama.

29. ***Selaginella idiospora*** Alston sp. nov. (Plate 6.)

Species heterophylla ex affinitate *S. guatemalensi*, caulibus prostratis repentibus c. 40 cm. longis, usque ad 1 mm. in diametro, in sicco pallide stramineis, glabris, ubique ramosis, ramulorum systema oblongo-linearis bipinnata gerentibus leviter angulatis; rhizophoris passim regulariter dispositis ventralibus rectis 0.5 mm. diametris; ramis alternatis circiter 1 cm. longis; foliis lateralibus caulium crebre dispositis, pagina superiore valde obscuriore, inaequilateralibus; semi-facie superiore semi-oblongo-ovato basi conspicue cordata supra caulem imbricato margine longe cilato, cellulis marginalibus elongatis perpaucis; semi-facie inferiore semi-oblongo, basi truncate integro apicem versus cuneato minute serrulato; foliis axillaribus ovato-oblongis, ciliatis; foliis intermediis suborbicularibus ciliatis, aristatis, aristis circa tertiam partem folium aequantibus; strobilis in apicibus ramulorum solitariis, tetragonis; sporophyllis ovato-deltaideis ciliolatis vel denticulatis carinatis leviter acuminate; megasporis non visis; microsporibus acervatim congregatis miniatis circa 22  $\mu$  crassis, triradiatis, in parte abaxiale muris circa 3  $\mu$  altis irregulariter anastomosantibus.

GUATEMALA. Forest along Saklak R., 300 m., below Secanquim, Alta Verapaz, *Pittier* 191 (BM, type); vicinity of Secanquim, c. 350 m., *Maxon & Hay* 3225 (BM); Finca Seamay, near Senahu, Alta Verapaz, 920 m., *Barton* (BM); Jocolo, Dept. Izabal, 30 m., *Johnson* 1124 (BM).

HONDURAS. On moist rocky cliff along the Danto River, slopes of Mt. Cangrejal, 335 m., *Yuncker, Koepfer & Wagner* 8728 (St.).

30. ***Selaginella revoluta*** Bak. in Journ. of Bot. xxi: 141 (1883).—Alston in Fedde, Repert. Sp. Nov. xlv: 315 (1936).

*Selaginella demissa* Christ in Bull. Herb. Boiss. sér. 2, i: 75 (1901).

PANAMA. Near El Valle de Anton, Dept. Coclé, on ground in forest, 1,000 m., *Alston* 8778 (BM).

Geographical range: Panama to Guiana (*Tutin* 544), northern Brazil and Peru.

31. ***Selaginella armata*** Bak. in Journ. of Bot. xxii: 90 (1884).

*Selaginella rhodospora* Bak., tom. cit.: 111 (1884).

*Selaginella eatoni* Hieron. ex Small, Ferns Trop. Florida: 67, t. 49 (1918).—Britt. & Millsp., Bahama Fl.: 477 (1930).—Correll in Amer. Fern. Journ. xxviii: 98 (1938).

UNITED STATES. Florida: Stuart, *Richardson* (BM); about lime sinks, border of everglade, Black Point Creek, *Eaton* 265 (W); in hammocks, Black Point, below Cutler, *Small & Carter* (W), 1147 (W); hammocks Long Key, *Small & Carter* 3224 (W).

Geographical range: southern Florida to Puerto Rico.



32. **Selaginella schiedeana** A. Braun in Index Sem. Hort. Berol. 1857, App.: 14 (1858?); in Ann. Sci. Nat. sér. 4, xiii: 62 (1860).—Conzatti, Fl. Tax. Mex. i: 143 (1946).

*Lycopodium serpens* sensu Cham. & Schlecht. in Linnaea v: 622 (1830); non Desv.

*Selaginella liebmanni* Fourn., Mex. Pl. 148 (1872), *nom. nud.*

*Selaginella fimbriata* Liebm. ex Fourn., loc. cit., in syn.

*Selaginella lychnuchus* var. *rigidiuscula* sensu Fourn., loc. cit.; non Spring.

MEXICO. San Luis Potosi: Tamazunchale, 400 m., on damp bank, *Copeland* 167 (BM). Vera Cruz: Papantla, *Schiede* (BM); near Papantla, *Liebmann* 2068 (H); Zacuapan, *Purpus* 2938 (BM; W), 7439 (BM; W); above Fortin, *Barnes & Land* 669 (BM); Songsong R. gorge, 950 m., on limestone in partial shade, *Copeland* 166 (BM); near Santa Maria Tlapacoyo, *Liebmann* 2069 (H); near Colipa, *Liebmann* 2070 (H).

Geographical range: confined to the states of San Luis Potosi and Vera Cruz in eastern Mexico.

33. **Selaginella stenophylla** A. Braun in Index Sem. Hort. Berol. 1857, App.: 22 (1858); in Ann. Sci. Nat. sér. 4, xiii: 83 (1860), sér. 5, iii: 291 (1865).—Conzatti, Fl. Tax. Mex. i: 142 (1946).

*Selaginella macroura* Liebm. ex Fourn., Mex. pl.: 148 (1872), in syn.

*Selaginella lychnuchus* sensu Fourn., loc. cit.; non Spring.

*Selaginella incurvata* Bak. in Journ. of Bot. xxi: 99 (1883).

*Selaginella vaginata* sensu Liebm. ex Bak., loc. cit. in syn.; non Spring.

*Selaginella miradorensis* Hieron. in Hedwigia xliii: 30 (1904); in Verh. Bot. Ver. Brandenb. li: 10 (1910).

*Selaginella martensii* sensu Davis, Life Pringle: 81, 332, 516 (1936) pro parte; non Spring.

MEXICO. San Luis Potosi: Tamasopo Canyon, *Pringle* 3293 (BM; NY; W), 4–500 m., *Pennell* 17995 (W); near Los Canos, *Palmer* 265 (BM; NY; W); Tamazunchale, 300 m., *Copeland* 165 (BM), 400 m., *Copeland* 'L' (BM); near Cancanhuitz, *Seler* 206 (ex Hieron.); Ciudad del Maiz, Valle del Rio Naranjos, *Seler* 749 (ex Hieron.). Hidalgo: Santa Ana, 40 km. north of Tacala, *Frye* 2546 (BM). Vera Cruz: Fortin, on clay banks, *Barnes & Land* 632 (BM; K); Orizaba, *Botteri* 79 (BM), *Mohr* 1300 (W), *Fisher* 59 (W); La Luz, near Cordoba, *Kerber* 62 (BM); Zacuapan, moist rocks, *Purpus* 2389 (BM; NY; W), 6193 (BM), *J. Purpus* 127 (W), *Liebmann* (H); Misantla, *Purpus* 5937 (BM; NY; W); Mirador, *Schaffner* 6 (K), *Liebmann* 2071 (H), 1,000 m., in woods, *J. Purpus* 128 (W); Valley of Cordoba, *Bourgeau* 1654 (K; W), 1655 pro parte (K); Córdoba, *Spence* (W); Chiquihuite, *Hahn* 2156 (K); Hacienda de Santa Barbara, *Liebmann* (K); Metlac R., 900 m., *Copeland* 165a (BM); Songsong R. gorge, 900 m., on limestone, *Copeland* 'N' (BM).

GUATEMALA. Rio Frio, Dept. Alta Verapaz. 1,200 m., *Johnson* 746 (BM; W); near Coban, 1,500 m., *Türckheim II.* 2114 (W).

Geographical range: confined to Mexico and Guatemala.

34. **Selaginella lychnuchus** Spring ex Klot. in Linnaea xx: 435 (1847) *nom. nud.*; in Mém. Acad. R. Belg. xxiv: 247 (1850).

COSTA RICA. Wet bank, La Hondura, Prov. San José 1,300–1,700 m., *Standley* 36193 (W), 36279 (W).

Geographical range: also in Venezuela.

35. *Selaginella martensii* Spring in Mém. Acad. R. Belg. xxiv: 129 (1850).—Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 707 (1886).—Conzatti, Fl. Tax. Mex. i: 142 (1886).

? *Lycopodium brasiliense* sensu Desf., Cat. Pl. H. R. Par. ed 3: 417 (1832).

? *Lycopodium stoloniferum* sensu Link, Hort. R. Bot. Berlin ii: 162 (1833).—Lindl. in Don, Hort. Cantab. ed. 13: 683 (1845); non Sw.

? *Selaginella decomposita* Spring in Mart., Fl. Bras. i, 2: 123 (1841) pro parte quoad pl. cult.

*Lycopodium flabellatum* sensu Mart. & Gal. in Mém. Acad. R. Belg. xv: 11 (1842); non L.

*Selaginella solmsii* Bak., Handb. Fern-Allies: 56 (1887).

MEXICO. San Luis Potosi: South Tamasunchali, *Clarke* 6880 (NY). Vera Cruz: Orizaba, *Botteri* 80 (BM), *Mohr* (W); Jalapa, *Orcutt* 2807 (BM; W); near Jalapa, *Rose & Hay* 6140 (W); Córdoba, *Schaffner* 7 (NY), *Bourgeau* 2275 (K); Zacuapan, *Purpus* 2177 pro parte (W), 6439 pro parte (BM); Huatusco, *Sandoval* 18 (W). Oaxaca: Cuicatlan district, *Conzatti* 3821 (NY); Cueva de Feutila, 900 m., near Cuicatlan, *Conzatti & Gomez* 3529 (W); near Plunia, 920–1,465 m., *Nelson* 2472 (W). Chiapas: Finca Irlanda, *Purpus* 7220 (BM; NY; W); Seltepec, *Matuda* 226 (K; W).

GUATEMALA. Finca Seamay, Senahu, Alta Vera Paz, 920 m., *Barton* 33 (BM); road between Verapaz and Chixoy, 1,200–1,300 m., *Steyermark* 43917 (BM); Volcán Santa Clara, near Finca El Naranjo, 1,250–2,650 m., *Steyermark* 46672 (BM); near Palohueco, Costa Grande, *Bernoulli & Cario* 181 (K, type of *S. solmsii* Bak.); near Patio de Bolas, above San Felipe, *Maxon & Hay* 3552 (W); mountain above Trece Aguas, Alta Verapaz, 855 m., *Cook & Doyle* 7d (W); Quebradas Secas, 450 m., Dept. Alta Verapaz, *Johnson* 946 (BM); Río Frio, 1,200 m., Alta Verapaz, *Johnson* 741 (BM), 742 (BM), 743 (BM); Pansamalá, Alta Verapaz, 1,160 m., *Donnell Smith* 1576 (W); Finca Helvetia, Dept. Quetzaltenango, 1,525 m., *Muenschner* 12174 (W); Volcan Santa Maria, near Patzulín, *Muenschner* 12175 (W).

COSTA RICA. Finca Navarro, 1,350 m., *Maxon* 626 (NY; W); El Muñeco, south of Navarro, Prov. Cartago, 1,400 m., *Standley* 33445 (W); Orosi, Prov. Cartago, *Standley* 39614 (W), 39866 (W).

PANAMA. Chiriqui, humid forest between Alto de las Palmas and top of Cerro de la Horqueta, 2,100–2,268 m., *Maxon* 5523 (BM).

Geographical range: Mexico to Panama.

One of the best known species in cultivation in European botanic gardens. Lindley gives the date of introduction into Britain as 1831. A number of horticultural forms have been given varietal names. *S. martensii* is a 'short-day' plant and Laibach has shown (F.I.A.T. Report No. 1093) that when there is a day cycle cone formation takes place earlier and cones are more numerous when exposed to a short-day (8 hours) cycle than with a long day (16 hours). Cone production is inhibited in sporeling cultures by high atmospheric humidity. Bright light intensity favours cone production.

forma **albovariegata** (Bull) Alston comb. nov.

*S. martensii* var. *albo-variegata* Bull in Proc. Hort. Soc. v: 194 (1865).

*S. martensii* var. *variegata* E. Morren in Belg. Hort. 1866: 129, t. 9.

A variegated form with white-tipped branches was first noticed in Messrs.

Jacob-Makoy's garden at Liège in 1865, and introduced into England by Messrs. Bull in the same year. There it was awarded a Second Class Certificate at the R.H.S. Show on 7 Nov. 1865.

forma **albolineata** (Moore) Alston comb. nov.

*S. martensii* var. *albo-lineata* Moore in Gard. Chron. 1870: 1535.

*S. watsoniana* Hort. Sander. in Gard. Chron. xxxiii, 1: 245 (1903).

A form in which the median leaves of the curving portions of the stem are white and the lateral leaves partially so. It was first noticed by Messrs. Perkins & Sons, Coventry, and may be due to a virus, as I have been informed that the white markings become more pronounced in a cool greenhouse.

36. ***Selaginella estrellensis*** Hieron. in Hedwigia xli: 200 (1902).

*Selaginella martensii* sensu Donn. Smith, Enum. Pl. Guat. iv: 180 (1895) pro parte; non Spring.

*Selaginella mnioides* sensu Christ in Dur. & Pittier, Primit. Fl. Costaric. i, 3: 254 (1896) pro parte; non Spring.

SALVADOR. Above Hacienda Los Planos, NE. of Metapan, Cerro Miramundo, 1,890–2,400 m., *Carlson* 890 (T).

COSTA RICA. Vicinity of Coliblanco, 1,950 m., *Maxon* 310 (NY); La Palma, Prov. S. José, 1,400 m., *Brade* 832 (NY), *Standley* 33007 (W); Cachi, 1,200 m., *Lankester* 627 (BM; W); Estrella, Prov. Cartago, 1,345 m., *Cooper* 6062 (BM; K; NY; W, type collection), *Standley* 39171 (W), 39189 (W), 39273 (W); Agua Caliente, near Cartago, *Lehmann* 71 (P); San José de Costa Rica, 1,525 m., *Lehmann* 24 (P); Las Nubes, Prov. S. José, 1,500–1,900 m., *Standley* 38352 (W), 38647 (W); Candelaria, 1,600 m., *Brade* 837 (BD); lieux frais, ombragés Roble, Massif de l'Irazu, *Tonduz* 4170 (W); region of La Esperanza, south slope of Volcán de Irazú, *Standley* 35377 (W); forêts de la Carpinteria, *Pittier* 118 (W); Cerro de la Carpinteria, 1,500–1,850 m., *Standley* 35566 (W), 35595 (W), 35620 (W); bois humides des collines supérieures de Santiago près San Ramon, 1,200–1,300 m., *Brenes* 14175 (W); Vara Blanca de Sarapiquí, between Poás and Barba volcanoes, 1,800 m., *Skutch* 3371 (W); Cerro de las Caricias, north of San Isidro, Prov. de Heredia, 2,000–2,400 m., *Standley & Valerio* 51971 (W); Viento Fresco, Prov. de Alajuela, 1,600–1,900 m., *Standley & Torres* 47763 (W); La Hondura, 1,450 m., *Valerio* 4 (W).

Geographical range: confined to the mountains of Costa Rica and Salvador.

*S. estrellensis* Hieron. is somewhat variable and resembles *S. martensii*, but may usually be distinguished by one or more of the following characters. The stems are usually prostrate with rhizophores springing mostly at right-angles from the lower two-thirds of the stem. The lateral leaves are more acute, more cordate on the upper side at base where they overlap the stem, usually long-ciliate at base on the upper side. The median leaves are nearly always long-ciliate and more polished than in *S. martensii*.

37. ***Selaginella mollis*** A. Braun in Ann. Sci. Nat. sér. 5, iii: 276 (1865).

*Selaginella schizobasis* sensu Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 709 (1886), pro parte; non Bak.

*Selaginella schrammii* Hieron. ex Standl. in Amer. Fern Journ. xvii: 8 (1927), pro parte quoad pl. panam.



MEXICO. Chiapas: *Ghiesbreght* 603 (BM), 604 (BM, K), 605 (BM); San Cristobal, *Munch* 16 (P).

BRITISH HONDURAS. Shady creek bank, Big Creek, 30 m., *Schipp* 925 (BM; BD).

NICARAGUA. Near Braggman's Bluff, *Englesing* 72 (BM; W); Sangsangta District, *Schramm* 20 (W); Cape Gracias a Dios, *Schramm* (W); near Bluefields, *Danneberger* (W); Waspuk District, *Schramm* 55 (BD); near El Recreo, on Rio Mico, 30 m., *Standley* 19176 (T), 19695 (T).

PANAMA. Santa Rita Trail, *Cowell* 116 (NY); Barro Colorado Id., *Standley* 31389 (W), 41090 (W); between Frijoles and Monte Lirio, 30 m., *Killip* 12149 (NY); Colon, forests around Porto Bello, 5-200 m., *Maxon* 5739 (BM); forest, El Valle de Anton, Prov. Coclé, 1,000 m., *Alston* 8741 (BM).

Geographical range: Mexico to Colombia.

38. ***Selaginella minima*** Spring in Bull. Acad. Brux. x: 139 (1843); in Mém. Acad. R. Belg. xxiv: 86 (1850).—Bak., Handb. Fern-Allies: 84 (1887).

COSTA RICA. Río Rosales, Grecia, 850 m., *Valerio* 1806 (W), 2086 (W).

PANAMA. Bald Hill, S. José Id., Perlas Arch., grassland on clay banks and about base of grass clumps, *Johnston* 878 (BM).

Geographical range: also in French Guiana.

*S. broadwayi* Hieron. from Trinidad is very close and may be conspecific.

39. ***Selaginella porphyrospora*** A. Braun in Ann. Sci. Nat. sér. 5, iii: 286 (1865).

*Selaginella bulbifera* Bak. in Gard. Chron. 1867: 783, 950.—A. Braun in Index Sem. Hort. Berol. 1867, App. 3: 1.—J. Smith, Ferns: Brit. & For. ed. 2: 325 (1896).

*Selaginella binervis* Liebm. ex Fourn., Mex. Pl. 148 (1872), in syn.—Bak. in Journ. of Bot. xxii: 112 (1884).—Donn. Smith, Enum. Pl. Guat. i: 68 (1889), op. cit. ii: 91 (1891).—Hieron. in Engl., Bot. Jahrb. xxiv: 579 (1905).—Alston in Journ. of Bot. lxxi: 243 (1933).—Conzatti, Fl. Tax. Mex. i: 141 (1946).

*Selaginella albonitens* sensu Christ in Dur. & Pittier, Primit. Fl. Costaric. i. 3: 255 (1896); non Spring.

*Selaginella bernoullii* Hieron. in Hedwigia xli: 192 (1902).

MEXICO. Jalisco: Rio Blanco, *Palmer* 558 (BM; NY; W); near Guadalajara, shaded wet rocks, *Pringle* 2593 (BM; NY; W). Hidalgo: Wet banks, barranca below Trinidad Iron Works, 1,675 m., *Pringle* 13260 (W). Vera Cruz: *Sartorius* (BD; BM, type of *S. porphyrospora* A. Braun); Dos Puentes, S. Antonio Huatusco, *Liebmann* (H; K, type of *S. binervis* Liebm.); Santa Maria Alpatlahua, *Liebmann* 2036 (H); Zacuapan, *Purpus* 7438 (W). Michoacan: Cerro San Miguel, 610 m., *Arsène* 5206 (W), 6648 (W), 10684 (W), 10685 (W); Cerro Azul, *Arsène* 5182 (BM; W), 5362 (W), 10682 (W), *Exsic. Ros.* 47 (W); Campanario, Morelia, *Arsène* 6784 (W). Mexico: El Oro, *Rangel* in *Arsène* 10683 (W). Morelos: San Antonio, near Cuernavaca, *Rose & Painter* 6943 (BM; W); near El Parque, *Rose & Painter* 7250 pro parte (BM), *Orcutt* 4401 (W). Puebla: Tezuitlan, *Orcutt* 4035 (BM). Chiapas: Cerro del Boqueron, *Purpus* 6720 (BM; W); Finca Irlanda, *Purpus* 6721 (BM; W).

GUATEMALA. Without exact locality, *Watson* 1066 (W); near Tecpam, 2,100 m., *Skutch* 627 (BM; W); roadside bank, Tecpam to Paques, Dept. Chimaltenango, 2,400 m., *Skutch* 699 (BM; W); Salama trail, above Llano Grande, on dripping rocks,

*Maxon & Hay* 3413 (NY; W); Cobán, Alta Verapaz, 1,350 m., *Johnson* 981 (BM); wet ground near Cobán, 1,400 m., *Türckheim II.* 2036 (BM; W); Pansamala, Alta Verapaz, 1,150 m., *Türckheim ed. J. D. S.* 1578 (W), 832 (W); in wood, Chicoyan, 1,350 m., *Türckheim II.* 1369 (W); on rocks in shade, oak-pine woods, Río Sitio Nuevo, between Santa Rosalía and the first waterfall, 1,200–1,500 m., *Steyermark* 42203 (BM); on wet ground, above San Juan Ixcay, 2,400 m., *Steyermark* 50006 (BM); Chihob, Alta Verapaz, 900 m., *Johnson* 823 (BM); along Río Frio, Dept. Izabal, 75 m., *Steyermark* 39925 (BM); Finca Moca, Dept. Suchitepequez, 1,000 m., *Muenschner* 12170 (BM).

HONDURAS. Wet shaded bank, vicinity of Siguatepeque, Dept. Comayagua, 1,080–1,400 m., *Standley* 56217 (BM; W); Dept. of Morazán, cloud forest on Mt. Uyoca, 2,000 m., *Williams & Molina* 14940 (BM); E. slope of Peña Blanca, San Juancito Mts., Dept. Francisco Morazan, 1,900–2,000 m., *Morton* 7307 (BM).

SALVADOR. Volcan Santa Ana, 1,800 m., *Schultze-Jena* 799 (BD).

NICARAGUA. *Ringgold & Rodgers* 3 (W); Mombacho Volcano, 1,050 m., in wet forest, *Maxon, Harvey & Valentine* 7797 (BM; W).

COSTA RICA. Alajuela, *Polakowsky* 115 (BM); Desamparados, *Tonduz* 927 (W); Faldas del Volcan Barba, 1,800 m., *Valerio* 1 (W); road from Vara Blanca (between Poás and Barba Volcanoes) to La Concordia, 1,600–1,950 m., *Maxon & Harvey* 8485 (W); Vara Blanca de Sarapiquí, between Poás and Barba Volcanoes, 1,800 m., *Skutch* 3375 (W), 1,500–1,750 m., *Skutch* 3190 (BM; W); Piedra Blanca, 2,450 m., *Valerio* 19 (W); Tablazo, 1,800 m., *Valerio* 1884 (W); west slope of Irazu, *Lehmann* 1032 (BM; W); near Fraijanes, Prov. Alajuela, 1,500–1,700 m., *Standley & Torres* 47493 (W), 47704 (BM; W); Dulce Nombre, Prov. Cartago, 1,400 m., *Standley* 35950 (W); El Muneco, south of Navarro, Prov. Cartago, 1,400 m., *Standley* 33684 (W); Yerba Buena, NE. of San Isidro Prov. Heredia, 2,000 m., *Standley & Valerio* 49176 (W), 49696 (BM; W); Las Nubes, Prov. San José, 1,500–1,900 m., *Standley* 38351 (W), 38358 (W), 38619 (W), 38625 (W), *Valerio* 2238 (W); La Palma, Prov. San José, 1,500–1,600 m., *Standley* 32934 (W), 38219 (W), *Valerio* 2243 (W); road from La Palma to La Hondura, 1,500–1,700 m., *Maxon & Harvey* 8084 (W); La Hondura, Prov. de S. José, 1,300–1,700 m., *Standley* 37580 (W), 37585 (W), 37748 (W), *Standley & Valerio* 51865 (BM; W); near Santa Maria de Dota, 1,500–1,800 m., *Standley* 41670 (W); Candelaria, *Brade* 836 (BD; NY); La Palma, *Brade* 72 (BM), 222 (BM; W), 284 (BD; NY), *Standley* 38063 (W); Navarro, *Lankester* (BM).

PANAMA. Valley of R. Piarnasta, above El Boquete, 1,550–1,650 m., *Killip* 5402 (W); Holcomb's trail above El Boquete, 1,650–1,925 m., *Maxon* 5642 (BM).

Geographical range: Mexico to Panama.

The following specimens have apparently entirely glabrous leaves and the false veins are not visible, but I believe that they are only a form of *S. porphyrospora*. One of the specimens (*Tonduz* 10694) was referred by Christ to *S. karsteniana* (in Pittier, *Primit. Fl. Costaric.* iii, 1: 61 (1901)).

COSTA RICA. Volcán de Barba, 2,300 m., *Valerio* 2362 (W); Volcán de Turrialba, near Finca del Volcan de Turrialba, 2,000–2,400 m., *Standley* 35029 (W), 35046 (W), 35151 (W); forêts de l'Achiote, Volcán de Poas, *Tonduz* 10696 (W), 2,200 m., 10694 (W); road from Vara Blanca to La Concordia, 1,600–1,950 m., *Maxon & Harvey* 8463

h h

(W); Las Nubes, Provincia de San José, 1,500–1,900 m., *Standley* 38554 (W); near Finca La Cima, above Los Lotes, north of El Copey, Prov. de San José, 2,100–2,400 m., *Standley* 42644 (W); near Fraijanes, Prov. Alajuela, 1,500–1,700 m., *Standley & Torres* 47489 (W).

Baker (loc. cit. (1867)) stated that *S. bulbifera* was unknown in a wild state, but J. Smith (loc. cit. (1896)) stated that it came from Venezuela, which appears to be an error.

40. ***Selaginella orizabensis*** Hieron. in *Hedwigia* xli: 193 (1902); op. cit. xliii: 10 (1904).

*Selaginella sartorii* A. Braun ex Fourn., *Mex. Pl.*: 149 (1872), *nom. nud.*; non Hieron.

MEXICO. Vera Cruz: Orizaba, *Müller* 268 (NY), *Müller* (type, ex Hieron.), *Weber* (ex Fournier); near Eugenio, Sierra de S. Cristobal, *Sartorius* (ex Hieron.).

Geographical range: confined to the mountains of Vera Cruz.

41. ***Selaginella novae-hollandiae*** (Sw.) Spring in *Bull. Acad. Brux.* x: 234 (1843).

*Lycopodium novae-hollandiae* Sw., *Syn. Fil.*: 184, 410 (1806).

*Selaginella radiata* sensu Hemsl. in Godman & Salvin, *Biol. C.-Amer.* iii: 708 (1886).—Christ in Dur. & Pittier, *Primit. Fl. Costaric.* i, 3: 258 (1896); non *L. radiatum* Aubl.

*Selaginella nicaraguensis* sensu Donn. Smith, *Enum. Pl. Guat.* iv: 130 (1895), pro parte; non Bak.—Christ in Pittier, *Primit. Fl. Costaric.* iii, 1: 62 (1901), pro parte.

*Selaginella serpens* sensu Donn. Smith., *Enum. Pl. Guat.* v: 102 (1899); non Spring.

NICARAGUA. Rocky cliff, Masaya, 250 m., *Hitchcock* (W).

COSTA RICA. Rio Grande, mossy rocks in woodland stream-bed, 240 m., *Lankester* 604 (BM); Lagarto, *Tonduz* 4799 (BM; W); Rio Toro Amarillo, Llanuras de Santa Clara, 300 m., *Donnell Smith* 6944 (BM; W); Guápiles, Llanos de Santa Clara, Comarca de Limon, 260 m., *Donnell Smith* 5107 (W); Pejivalle, 650 m., on stones, *Valerio* 6 (W), 17 (W); near Pejivalle, Prov. Cartago, c. 900 m., *Standley & Valerio* 46881 (W), 46968 (W); Forêts de Boruca, *Tonduz* 4434 (W); Tablazo, *Biolley* 108 (W); S. Isidro, near S. Ramón, 1,300 m., *Brenes* 14495 (W); near Juan Vindo, R. Chio Distr., 1,200 m., *Brade* 829 (BD); Turrialba, *Brade* 828 (BD); Aguacate, *Hoffmann* 1 (K).

PANAMA. Hills west of Soná, c. 500 m., *Allen* 1074 (BM).

Geographical range: Nicaragua southwards to Argentina.

42. ***Selaginella cladorrhizans*** A. Braun in *Ann. Sci. Nat. sér.* 5, iii: 282 (1865).

MEXICO. Tepic: Trail to Ensenada de Matuchen, near San Blas, *Ferris* 5438 (W). Jalisco: Santa Cruz de Vallarta, along stream-bed, 300 m., *Mexia* 1276 (BM; W). Colima: Alzada, *Orcutt* 4640 (BM). Guerrero: Temisco, damp earth above stream, Sierra Madre del Sur, Distr. Adama, 300 m., *Mexia* 8755 (BM); Barranca de la Julia, Temisco, 350 m., *Mexia* 8725 (BM).

BRITISH HONDURAS. River Bluffs, El Cayo, *Bartlett* 11457 (BM); Rio Grande, *Schipp* 8–817 (BM); Sibun River, Gracie Rock, *Gentle* 1759 (W).

GUATEMALA. On clay banks, Jocoló, Dept. Izabal, 30 m., *Johnson* 987 (BM); Río Santa Isabel, between mouth of Rio Sebol and El Porvenir, 100 m., *Steyermark* 45822 (BM), 45854 (BM).

PANAMA. Rio Tapia, Prov. Panama, *Standley* 26164 (BM).

Geographical range: Mexico southwards to Venezuela.



43. **Selaginella flagellata** Spring in Bull. Acad. Brux. x: 228 (1843).—Donn. Smith, Enum. Pl. Guat. vii: 65 (1905).

*Selaginella rhizophora* Bak. in Journ. of Bot. xxii: 244 (1884).

MEXICO. Colima: Nevado de Colima, *Gadow* (BM). Chiapas: Cacahuatan, 550 m., on trees, *Fisher* 35398 (BM; W).

GUATEMALA. Chilion near Mazabenango, *Bernoulli* 472 (NY); abundant in forest on shady rocks, Finca Mocca, Alta Verapaz, 975 m., *Johnson* 97 (W); Cubilquitz, Alta Verapaz, 350 m., *Türckheim II.* 772 & ed. *D. Smith* 8653 (W); banks of Rio Xibana, Finca San José Nil, Retalhuleu, *Hatch & Wilson* 402 (W); lowland forest along Río San Román, west of Chinajá, 50 m., *Steyermark* 45512 (BM).

NICARAGUA. Sangsangta, Segovia District, *Schramm* 2 (W), 18 (W); Bluefields, *Danneberger* (W).

COSTA RICA. Nicoya, *Tonduz* 13761b (BM); Pasoagres, Alajuela Prov., *Lankester* 6034 (BM); Cocos Id., *Barclay* 2210 (BM).

PANAMA. Near San Juan, *Seemann* 29 (K); Chiriqui, *Hart* 22a (K); Corozal Road, Panama, Prov. of Panama, *Standley* 26850 (BM); near Panama, *Seemann* 32 (K); Gamboa, Canal Zone, *Standley* 28424 (BM); Ancon Hill, Canal Zone, *Standley* 25171A (BM); Fort San Lorenzo, Fort Sherman Military Reservation, Canal Zone, *Maxon & Valentine* 7000 (W), 7006 (W), 7014 (W); Valley of Masambí, on road to Las Cascadas Plantation, 20–100 m., Canal Zone, *Maxon* 4676 (BM; W); San José Island, Perlus Archipelago, *Johnston* 344 (BM), 366 (BM), 1049 (BM).

Geographical range: Mexico to Bolivia (*Buchtien* 2252) and French Guiana.

44. **Selaginella exaltata** (Kunze) Spring in Bull. Acad. Brux. x: 234 (1843).—Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 706 (1886).

*Lycopodium exaltatum* Kunze in Linnaea ix: 8 (1835).

PANAMA. *Hayes* 41 (NY), *Cowell* 424 (NY); between Mt. Hope and Santa Rita Trail, *Cowell* 69 (NY); Obispo Falls, *Hayes* 25 (ex Hemsl.); Bismarck, *Williams* 476 (NY; W); road from Colon to Gatun, *Celestine* 94 (W); near Gatun, *Hayes* 49 (BM; W); small island on Gatun Lake, *Ostenfeld* 102 (W); Lion Hill, *Howe* (NY); Agua Clara Reservoir, C. Z., *Stevens* 555 (W); Bojio Station, *Hayes* (BM); Darien, *Shakespeare* (BM); along Sembú R., S. Darien, above tide limit, *Pittier* 5554 (W); dense forest along Frijoles R., near Gatun Lake, *Killip* 2803 (BM; W); Trinidad R., west of Gatun Lake, *Rowlee* 403 (W); along Trinidad R., near sea-level in forest, *Pittier* 4004 (W); Perine, San Blas District, *Cooper* 249 (W); forests around Puerto Obaldía, San Blas Coast, *Pittier* 4325 (W).

Geographical range: Panama southwards to Peru.

Hieronymus, in Engl. & Prantl, Nat. Pflanzenfam. i, 4: 710 (1901), gives also Guatemala, but I have seen no specimens from that country and do not know the basis of the record.

The main stem is articulate, but the lateral branches are without articulations.

45. **Selaginella articulata** (Kunze.) Spring in Flora xxi: 182 (1838); in Ann. Sci. Nat. sér. 2, xi: 228 (1839); in Bull. Acad. Brux. x: 229 (1843).

*Lycopodium articulatum* Kunze in Linnaea ix: 10 (1835); Farrnkr. i: 243, t. 99 (1847).

PANAMA. El Valle de Anton, 1,000 m., *Alston* 8753 (BM), *Allen* 1649 (BM), 1904 (BM), 2363 (BM), *Seibert* 451 (W).

Geographical range: southwards to Peru.

Originally described by Kunze from a *Poeppig* specimen collected in woods at Tocache Mission in the Dept. of Loreto, Peru. A specimen from Monte Campana, near Tarapoto, *Spruce* 4627 (BM) agrees well with the Panama specimens and has, like them, pubescent branches.

46. *Selaginella arthritica* Alston in Archiv. Bot. xi: 43 (1935).

*Selaginella conduplicata* sensu Spring in Mart., Fl. Bras. i, 2: 129 (1840), pro parte; non Spring (1838); Spring in Mém. Acad. R. Belg. xxiv: 229 (1850) pro parte excl. pl. Bras. & Guian.

*Selaginella geniculata* var. *conduplicata* (Spring) A. Braun in Ann. Sci. Nat., sér. 5, iii: 303 (1865), pro parte quoad pl. Billberg.

*Selaginella geniculata* sensu Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 707 (1886); non Spring.

*Selaginella anceps* sensu Donn. Smith, Enum. Pl. Guat. iv: 179 (1895); v: 102 (1899); non A. Braun.

*Selaginella nicaraguensis* sensu Donn. Smith, tom. cit.: 180 pro parte.—Christ in Pittier, Primit. Fl. Costaric. iii, 1: 62 (1901), pro parte.

*Selaginella geniculata* subsp. *elongata* sensu Christ in Bull. Herb. Boiss. sér. 2, vi: 288 (1906); non Klotzsch.

NICARAGUA. Chontales, *Seemann* 234 (BM), *Tate* 81 (BM); moist mixed forest near El Recreo, on Rio Mico, 30 m., *Standley* 19311 (T), 19327 (T).

COSTA RICA. Confluents to Puerto Viejo and Sarapiquí, *Biolley* 7508 (W); Camillo, *Cooper* 573 (W); Piedra del Convento, *Pittier* & *Tonduz* 3577 (W); Boca Culebra, *Pittier* 12089 (W); forests of Tuio, 650 m., *Tonduz* 11344 (W); Monte Verde, 92 m., *Stork* 1668 (W); La Hondura, 1,400 m., *Valerio* 12 (W); near El General, Prov. San Jose, 610 m., *Skutch* 3896 (BM); Guacimo, 140 m., *Tonduz* 14553 (BM); near Angostura, *Polakowsky* 446B (BM), 500 (BM); near Puerto Jimenez, *Cufodonti* 218 (BM); Finca Montecristo, R. Reventazon below Cairo, Prov. Limon, *Standley* & *Valerio* 48505 (W); mouth of R. Reventazon, *Cufodonti* 479 (BM); Livingston on Reventazon, *Rowlee* & *Stork* 621 (W); Las Delicias, Santa Clara, *Biolley* 10661 (W); Santa Clara, *Cooper* 10202 (W), 10286 (W); Guapiles, Llanos de Santa Clara, *Donnell Smith* 5106 (NY; W); Jimenez, Llanos de Santa Clara, 200 m., *Donnell Smith* 5104 (W), 5906B (NY; W); Surre, Llanuras de Santa Clara, 300 m., *Donnell Smith* 6945 (K; NY; W); Turrialba, *Brade* 831 (NY); Pirris, 20 m., *Biolley* fil. 17401 pro parte (W); Guanacaste, *Brade* 841 (NY); near Carmen Station on Indiana Branch, Prov. Limon, 30 m., *Standley* & *Valerio* 48382 (W); La Colombiana Farm, Prov. Limon, 70 m., *Standley* 36760 (W), 36798 (W); Naranjos Agrios, Prov. Guanacaste, 600–700 m., *Standley* & *Valerio* 46476 (W); La Tejona, north of Tilarán, Prov. Guanacaste, 600–700 m., *Standley* & *Valerio* 45881 (W); Los Ayotes, near Tilarán, Prov. Guanacaste, 600–700 m., *Standley* & *Valerio* 45455 (W); near Tilarán, Prov. Guanacaste, 500–680 m., *Standley* & *Valerio* 44955 (W); El Silencio, Prov. Guanacaste, 750 m., *Standley* & *Valerio* 44600 (W), 44641 (W), 44755 (W), 44761 (BM; W); near Pejivalle, Prov. Cartago, 900 m., *Standley* & *Valerio* 46891 (W); between Aserri and Tarbaca, Prov. San José, 1,200–1,700 m., *Standley* 45278 (W); Cuesta de la Vieja, road to San Carlos, 300 m., *Cook* & *Doyle* 110 (W).

PANAMA. *Parry* (NY), *Miller* (BM); Bocas del Toro, Laguna de Chiriqui, *Hart* 2 (W), 33 (W); Rio Tecumen, Prov. Panamá, *Standley* 29346 (W); Rio Tapiá, Prov. Panamá, *Killip* 2891 (W), *Standley* 26131 (W), 26165 (W); near Tapia R., Juan Diaz Region, Prov. Panamá, *Maxon & Harvey* 6714 (BM; W), 6725 (BM; W); El Valle de Anton, 1,000 m., *Alston* 8690 (BM); Orange River, Juan Diaz, *Killip* 2546 (BM; W) 2633 (W), 2783 (W); along Río Chilibre, *Piper* 5668 (W); forests on dry limestone, around Alhajuela Chagres Valley, 30–100 m., *Pittier* 2392 (BM; NY); Bismarck, 610 m., *Williams* 475 (NY; W); Headquarters of Rio Chinilla, above Nuevo Limón, C.Z., *Maxon* 6872 (W), 6874 (W); forests around El Vigía, C.Z., *Pittier* 2393 (W); Obispo, C.Z., *Standley* 31693 (W); Rio Paraíso, above East Paraíso, C.Z., *Standley* 29911 (BM; W); Valley of Masambí, on road to Las Cascadas Plantation, C.Z., 20–100 m., *Maxon* 4672 (W); Bojio Station, *Hayes* (BM); Gamboa, C.Z., *Standley* 28402 (W), 28414 (W); Fort Sherman, C.Z., *Standley* 31099 (W); between Chagres Batteries and Fort San Lorenzo, Fort Sherman Reservation, C.Z., *Maxon & Valentine* 7022 (W); Chagres, *Fendler* 383 (BM; W); hilly forest around Agua Clara Reservoir, near Gatun, C.Z., 20–30 m., *Maxon* 4647 (W); forest along R. Indio de Gatun, C.Z., near sea-level, *Maxon* 4873 (W); hills north of Frijoles, C.Z., *Standley* 27415 (W), 27456 (W); near Frijoles, C.Z., *Piper* 5783 (NY; W); between Frijoles and Monte Lirio, 30 m., *Killip* 12160 (NY; W); Río Agua Salud, near Frijoles, C.Z., *Piper* 5845 (W); Barro Colorado I., Gatun Lake, *Maxon, Harvey & Valentine* 6791 (W), *Seibert* 563 (W), *Dodge* 3455 (NY; W), *Kenoyer* 63 (W), *Standley* 31270 (W), 31487 (W), 40840 (W), *Silvestre Avelles* 25 (W); Porto Bello, *Billberg* (W), 5–200 m., *Maxon* 5741 (BM; W), 5762 (W); around Dos Bocas, Río Fató Valley, Prov. Colon, 40–80 m., *Pittier* 4219 (W).

Geographical range: Nicaragua to Panama, up to 1,700 m.

The type-specimen of *S. conduplicata* was from Brazil (Pará, *Martius*), and is identical with *S. stellata* Spring, as stated in my account of the Brazilian species of *Selaginella*, in Fedde, Repert. Sp. Nov. xl: 309 (1936).

The colour of the leaves varies from dark green to reddish-bronze. The black spots on the leaves of some specimens (e.g. *Pittier* 4219, *Donnell Smith* 5106) appear to be due to a fungus (*Trichothyrium* sp.).

Prostrate, sterile specimens of *S. arthritica* resemble *S. schizobasis* Bak. superficially, but lack the divergent auricles of the axillary leaves. Some specimens of *S. galeottii* are almost erect, but have ovate-lanceolate (not ovate) unequal-sided axillary leaves, ciliate lateral leaves, and biauriculate median leaves.

47. ***Selaginella marginata*** (Humb. & Bonpl.) Spring in Flora xxii: 194 (1838).

*Lycopodium marginatum* Humb. & Bonpl. ex Willd., Sp. Pl. v: 41 (1810).—Kunth, Syn. Pl. i: 96 (1822); Nov. Gen. & Spec. i: 39 (1816), vi: 437 (1825).

MEXICO. Sinaloa: Chupaderos, banks, 300–350 m., *Pennell* 20187 (W); S. Ignacio, *Ortega* 429 (K); La Noria, foothills, *Mexia* 222 (W). Durango: La Bajudo, Tamazaba, 300–600 m., *Ortega* 4465 (W). Tepic: Acaponeta, *Rose* 3148 (BM; NY; W); Tiger Mine, Acaponeta, *Jones* 23494 (BM; NY). Vera Cruz: Pinahuastepec, near Perote, *Humboldt & Bonpland* (ex Kunth). Guerrero: La Correa, *Langlassé* 371 (K; W).

Geographical range: Mexico, southwards to Uruguay and Northern Argentina.



Humboldt & Bonpland's Mexican locality is given in Nov. Gen. & Spec. i: 39, but Willdenow (Sp. Pl. v: 41) gives 'America meridionalis', and Spring (in Mart. Fl. Bras. i, 2: 127 (1840)) excludes the Mexican locality. A. Braun (in Ann. Sci. Nat. sér. 5, iii: 293 (1865)) based his *S. humboldtiana* on a specimen of Humboldt's from the Orinoco which was found in Kunth's herbarium mixed with *S. marginata*. The type-specimen in the Willdenow herbarium is labelled as from the Bocca de Meta, Orinoco, which is the mouth of the R. Meta. It seems quite possible that Humboldt's Mexican specimen was a supposed duplicate sent to Kunth, and it may have been some other species, such as *S. galeottii*.

48. *Selaginella sertata* Spring in Mém. Acad. R. Belg. xxiv: 104 (1850).

*Selaginella nicaraguensis* Bak. in Journ. of Bot. xxi: 333 (1883).—Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 708, t. 109A (1886).

*Selaginella galeottii* sensu Donn. Smith, Enum. Pl. Guat. iv: 179 (1895); non Spring.

MEXICO. Sinaloa: Camino del Cardonal, Distr. S. Ignacio, *Salazar* 429 (W). Tepic (Nayarit): Old Spanish road between Singaita and La Libertad, *Ferris* 5546 (W). Jalisco: on sandy river bottom, Quimixto, 5 m., *Mexia* 1187 (NY; W). Colima: Alzada, *Orcutt* 4617 (W), 4673 (BM; W). Guerrero: Near Acapulco, *Palmer* 47 (BM; K; NY; W); wet places on rocky slopes, Pantla, 50 m., *Langlassé* 264 (W). Campeche: in inundated forest, Champoton, *Steere* 1944 (W).

GUATEMALA. Santa Barbara, Dept. Solola, 420 m., *Shannon* 128 (W), 129 pro parte (W).

SALVADOR. La Cebadilla, *Calderon* 1227 (NY; W); Sonsonate, 160 m., *Schultze-Jena* 670 (BD).

HONDURAS. Amapala, Valle, 10 m., *Valerio* 3367 (W).

NICARAGUA. Granada, *Levy* 360 (K, type of *S. nicaraguensis*), *Maxon, Harvey & Valentine* 7586 (W), 7591 (W); near Laguna de Masaya, 250–300 m., *Hitchcock* (W), *Maxon* 7723 (W), 7725 (W), 7746 (W); slopes of Santiago Volcano, Masaya, 300–480 m., *Maxon* 7695 (W), 7702 (W); Managua, *Chaves* 53 (W); near Chichigalpa, Dept. Chinandega, 90 m., *Standley* 11248 (T), 11529 (T).

COSTA RICA. Nicoya, *Sinclair* (K); forests of Nicoya, Prov. Guanacale, *Tonduz* 13761a (BM); Surubres, 250 m., *Biolley* 17400 (W); Pasoagres, Prov. Alajuela, *Lankester* 603 (BM; W).

PANAMA. *Sinclair* 49 (K, type of *S. sertata*); trail from San Felix to Cerro Flor, 100–850 m., *Allen* 1959 (BM).

Geographical range: Mexico to Panama, mainly at low elevations.

*Sinclair*'s sheet bears the localities Nicoya and Panama. It may represent two collections, but it is more likely that Hooker thought that Nicoya was in Panama.

This species is usually easily recognized by the prolonged stem apices which root at the tip, giving rise to small plants which often have leaves of a much thicker texture. The lateral leaves diverge at an angle in most specimens, instead of spreading at right angles as in *S. horizontalis* (Presl) Spring: these lateral leaves are often withered, in July, in plants which appear to be resuming active growth after a spell of dry weather, while more typically developed specimens are frequent in November. Similar specimens of *S. schizobasis* Bak. have broader lateral leaves.

49. ***Selaginella silvestris*** Aspl. in Ark. Bot. xxa, 7: 30, fig. 3-5 (1926).

*Selaginella mnioides* sensu Christ in Dur. & Pittier, Primit. Fl. Costaric. i, 3: 254 (1896), pro parte; non A. Braun.

*Selaginella Poeppigiana* sensu Hieron. in Engl., Bot. Jahrb. xxxiv: 581 (1905); non Spring.—Standl. in Publ. 283, Field Mus. Nat. Hist., Bot Ser. x: 84 (1931).

MEXICO. Hidalgo: By stream near Zacualtipan, 2,000 m., *Moore* 5286 (BM). Vera Cruz: Head of Orizaba Valley, 2,400 m., *Copeland* '168' (BM); Misantla, *Purpus* 5937, pro parte (W). Chiapas: Tacana, 2,800 m., *Matuda* 2911 (K).

GUATEMALA. Along trail, Cafetales, south slope of Volcan Atitlan, 1,525 m., Finca Mocá, Guataloa, *Hatch & Wilson* 363 (W); Finca Seamay, Senahu, 920 m., Alta Vera Paz, *Barton* 30 (BM), 31 (BM).

HONDURAS. Puerto Sierra, *Wilson* 67 (NY); Hacienda la Zumbadora, Dept. Copán, *Blake* 7377 (W); wet mountain forest, Lancetilla valley, near Tela, Dept. Atlántida, 20-600 m., *Standley* 52752 (W), 54439 (W); near Lancetilla, *Yuncker* 4505 (BM); San Juan Junction, in banana plantation, near sea-level, *Dyer* A.220 (W); deep forest along Danto R., lower slopes of Mt. Cangrejal, *Yuncker, Koepfer & Wagner* 8490 (St.).

COSTA RICA. Rancho Flores, 2,043 m., *Tonduz* 2082 (W); Llanos de Turubres, south of Puntarenas, *Biolley* 2687 (W); confluent of Puerto-Viejo and of Sarapiquin, *Biolley* 7507 (W); Vara Blanca, between Poás and Barba volcanoes, 1,600-1,700 m., *Maxon & Harvey* 8378 (W); El Arenal, Prov. Guanacaste, 485-600 m., *Standley & Valerio* 45189 (W); El Silencio, near Tilaran, Prov. Guanacaste, 750 m., *Standley & Valerio* 44569 (W); Los Ayotes, near Tilaran, Prov. Guanacaste, 600-700 m., *Standley & Valerio* 45389 (W); Cerro de las Caricias, north of San Isidro, Prov. Heredia, *Standley & Valerio* 52268 (BM; W); Cerro de Las Lajas, north of San Isidro, *Standley & Valerio* 51442 (W); near Fraijanes, Prov. Alajuela, 1,500-1,700 m., *Standley & Torres* 47706 (W); La Palma, Prov. San José, 1,600 m., *Standley* 33060 (W), 38064 (W); El Muñeco, south of Navarro, Prov. Cartago, 1,400 m., *Standley* 33550 (W); Hacienda El Baul, 350-400 m., *Tonduz & Torres Rojas* 7 (W).

PANAMA. Chiriquí, *Hart* 29a (K); Research Lagoon, near Almirante, Prov. Bocas del Toro, *Cooper* 141 (NY).

Geographical range: Guatemala southwards to Bolivia.

The exauriculate axillary leaves, distant stem leaves, and flabellate branches are characteristic. The axillary leaves are broader than in *S. kunzeana* A. Braun.

50. ***Selaginella galeottii*** Spring in Bull. Acad. Brux. x: 230 (1843).—Donn. Smith, Enum. Pl. Guat. ii: 92 (1891).—Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 706 (1886) (as '*galeotti*').—Conzatti Fl. Tax. Mex. i: 141 (1946).

*Lycopodium stoloniferum* sensu Schlecht. & Cham. in Linnaea v: 622 (1830); non Sw.—Mart. & Gal. in Mém. Acad. R. Brux. xv: 12 (1842).

*Lycopodium sulcatum* sensu Kunze in Linnaea xviii: 34 (1844); non Desv.

? *Selaginella poeppigiana* var. *mexicana* Spring in Mém. Acad. R. Brux. xxiv: 218 (1850).

*Selaginella geniculata* sensu Donn. Smith, Enum. Pl. Guat. i: 68; (1889); non Spring.

*Selaginella anceps* sensu Christ in Dur. & Pittier, Primit. Fl. Costaric. i, 3: 253 (1896), pro parte; non A. Braun.

*Selaginella mnioides* sensu Hieron. in Engl., Bot. Jahrb. xxxiv: 581 (1905), pro parte; non A. Braun.

*Selaginella mandaiana* hort. ex Underw. & Bened. in Bailey, Standard Cycl. Hort. vi: 3141 (1917), *nom. nud.*—Graustein in Bot. Gaz. xc: 50, 59 (1930).

MEXICO. Vera Cruz: Jalapa or Mirador, *Galeotti* 6606 (P, type; phot. BM); Citlaltepetl, *Gadow* (BM); Zacuapan, *Purpus* 2177 (BM), 6439 (BM; W), 8922 (W), 15216 (BM), 15407 (BM), 15413 (BM); Jalapa, *Schiede & Deppe* (BM); near Jalapa, 1,375 m., *Pringle* 11804 (W); wet woods along Coatepec road, *Barnes & Land* 573 (W); Córdoba, *Bourgeau* 1425 (BM), *Woronow* 2956 (BM; W), *Fisher* 12 (W), *Leeds* 137 (W), *Orcutt* 3370 (W), *Copeland* 'P' (BM); near Orizaba, *Pringle* 6107 (BM; W), *Bourgeau* 2371 (W); Orizaba, *Mohr* (W), *Botteri & Mohr* (W); Puebla, Orizaba, *Nicolas* in *Exsic Ros.* 72 (W); near Puebla, *Ginest-Antonio* 8 (W); Mirador, 1,000 m., in woods, *J. Purpus* 130 (W), 131 (W); Coscomatepec, *Kempton & Collins* (W); Metlac R., 900 m., *Copeland* 169 (BM). Oaxaca: Near Totontepec, 1130–1,675 m., *Nelson* 813 (W); Sierra San Pedro Nolasco, Talea, *Jürgensen* 527 (BM); Monte de la Parado, *Sallé* (BM); near Teotalingo, Chinantla, *Liebmann* 30 (W); Montaña, Santa Maria, in forest, 1,500 m., *Mexia* 9281 (BM). Chiapas: Near Tumbala, 1,320–1,675 m., *Nelson* 3348 (W); Mt. Tacana, 1,000–2,000 m., *Matuda* 2440 (K).

BRITISH HONDURAS. *Schipp* 52 (BM; NY; W).

GUATEMALA. Cerro Victoria, near Barillas, 1,800–2,000 m., Dept. Huehuetenango, *Steyermark* 49718 (BM); near Maxbal, north of Barillas, 1,500 m., *Steyermark* 48822 (BM); Cerro Negro, 1,600–2,000 m., *Steyermark* 51661 (BM); Coban, Dept. Alta Verapaz, *Türckheim* ed. *Keck* 4 (BM; W), II. 1268 (W), II. 1363 (BM), *Johnson* 8 (W), *Morales* 525 (W); Finca Seamay, Senahu, Alta Vera Paz, *Barton* 32 (BM); between Copán and Gualán, *Bernoulli & Cario* 171 (K); 8 km. NW. of Cubilguitz, 250–300 m., *Steyermark* 44685 (BM); between Careha and Lanquin, Dept. Alta Vera Paz, *Lehmann* 1375 (BM; W); Samác, Alta Verapaz, 1,375 m., *Johnson* 821 (W); Quebradas Secas, 750 m., *Johnson* 949 (BM); road between Chamá and Cobán, Dept. Alta Verapaz, 750 m., *Johnson* 827 (BM); Rio Coban, 1,200 m., *Johnson* 669 (BM); mountains above Trece Aguas, 920 m., Alta Verapaz, *Cook & Doyle* 7c (W); Tamajú, Dept. Alta Verapaz, 1,220 m., *Donnell Smith* 1579 (W); Chicoyonito, Dept. Alta Verapaz, 1,320 m., *Donnell Smith* 1575 (W); Pansamalá, Dept. Alta Verapaz, 1,220 m., *Türckheim* 972 (W); Sanchamac, Dept. Alta Verapaz, 1,345 m., *Türckheim* ed. *Keck* 4a (W), *Türckheim* (W); near Secanquin, Alta Verapaz, 550 m., *Maxon & Hay* 3220 (W); Secanquin, *Cook & Griggs* 270 (W).

COSTA RICA. Cachi, 1,200 m., *Lankester* 627a (BM; W); forests of Juan Vinas 1,135 m., *Pittier* 1820 (W); near Orosi, Cartago, *Standley* 39615 (W), 39625 (W), 39848 (W); Navarro, Cartago, *Torres Rojas* 141 (W); El Muñeco, Rio Navarro, Cartago, *Standley & Torres* 51021 (W), 51074 (W), 51091 (W), 51183 (W), 51375 (W), *Standley* 33459 (W), 33857 (W); La Estrella, Cartago, *Standley* 39365 (W); near La Palma, on road to La Hondura, 1,500–1,700 m., *Maxon & Harvey* 8089 (W); near La Palma, 1,450–1,550 m., *Maxon* 439 (W); La Hondura, 1,400 m., *Valerio* 1 (W), *Standley* 36608 (W), 37724 (W); Tapautí, 1,200 m., *Valerio* 2241 (W).

Geographical range: Mexico to Costa Rica, usually above 1,220 m.

Spring's records for Bolivia (*d'Orbigny*) and Panama (*Sinclair*) were no doubt errors of identification, as stated by Hemsley. The Bolivian specimen was the basis of *S. macrophylla* A. Braun.



The habit of this species sometimes approaches that of certain specimens of *S. arthritica*. *S. arthritica* is usually separable by the absence of long, brittle, marginal cilia at the base of the lateral leaves, while its lateral leaves are denticulate or subentire.

51. ***Selaginella intacta*** Bak. in Journ. of Bot. xxi: 335 (1883).

*Selaginella schiedeana* sensu Christ in Donn. Smith, Pl. Guat. iv: 180 (1895); in Pittier, Primit.

Fl. Costaric. iii, 1: 62 (1901); non A. Braun.

*Selaginella serpens* sensu Christ in Dur. & Pittier, Primit. Fl. Costaric. i, 3: 255 (1896) pro parte; non Spring.

*Selaginella atirrensensis* Hieron. in Engl. & Prantl, Nat. Pflanzenfam. i, 4: 711 (1901); in Engl., Bot. Jahrb. xxxiv: 582 (1905).—Christ in Bull. Herb. Boiss. sér. 2, vi: 288 (1906).—Donn. Smith, Enum. Pl. Guat. vii: 73 (1905).

COSTA RICA. Uren R., Talamanca Valley, Rowlee 341 (NY; W); near Atirro, Prov. Cartago, 650 m., Donnell Smith 5103 (NY; W, type collection of *S. atirrensensis*); Las Nubes, Prov. S. José, 1,500–1,900 m., Standley 38668 (W); confluent of Puerto Viejo and R. Sarapiquí, Biolley 7510 (W); La Guaba, 1,900 m., Valerio 2363 (W); La Palma, 1,500 m., Prov. S. José, Wercklé 17037 (BM), Standley 32903 (W), 32952 (W); Chirripo, 31 m., Tonduz 14552 (BM; W); near railway bridge on Banama R., near Pt. Limon, on rocks, Pittier 3638 (W); Hamburg Finca, on Rio Reventazón below Cairo, Prov. Limon, 58 m., Standley & Valerio 48728 (BM), 48852 (W); Yerba Buena, NE. of San Isidro, Prov. Heredia, 2,000 m., Standley & Valerio 49071 (W); Cerros de Zurquí, NE. of San Isidro, Prov. Heredia, 2,000–2,400 m., Standley & Valerio 50267 (W), 50484 (W).

PANAMA. In potrero, bank of Changumola R., Dunlap 348 (W); Holcomb's Trail, above El Boquete, Chiriquí, 1,450–1,650 m., on stones near river, Maxon 5702 (W).

Geographical range: Costa Rica southwards to Ecuador.

Baker's epithet *intacta* is most inappropriate, as the larger leaves are often strongly ciliate. The dorsal rhizophores help to distinguish this from some of the non-articulate species.

52. ***Selaginella diffusa*** (Presl) Spring in Bull. Acad. Brux. x: 143 (1843).

*Lycopodium diffusum* Presl, Rel. Haenk.: 78 (1825).

*Selaginella polycephala* Bak. in Journ. of Bot. xxi: 332 (1883).

*Selaginella kunzeana* sensu Christ in Dur. & Pittier, Primit. Fl. Costaric. i, 3: 254 (1896) pro parte; non A. Braun.

COSTA RICA. La Palma, 1,400 m., Brade ed. Ros. 75 (BM; W), 833 (NY), Maxon 452 (NY; W); 1,500 m., Bertolini 597 (W), 598 (W), Valerio 2244 (W); 1,600 m., Standley 32955 (W), 33056 (W), 38087 (W); vicinity of La Palma, on the road to La Hondura, 1,500–1,700 m., Maxon & Harvey 7877 (W), 7953 (W), 8044 (BM; W); La Hondura, Prov. S. José, 1,200–1,500 m., Standley & Valerio 51887 (F; W), Standley 36296 (W), 36501 (W); 1,450 m., Valerio 10 (W); Carillo, 300 m., Pittier 568 (W), Cooper 568 (W); Boniela, Ridgway (W); on shady bank, Vara Blanca de Sarapiquí, northern slope of Central Cordillera, between Poás and Barba volcanoes, 1,370 m., Skutch 3493 (St.).

PANAMA. In forest. El Valle de Anton, 1,000 m., Alston 8759 (BM).

Geographical range: Costa Rica to Trinidad, Venezuela and Colombia, at medium elevations.

The original label on the type-specimen of *Lycopodium diffusum* reads 'Paramo', to which C. Presl has added 'in Panama'. There are no 'páramos' in Panama.

*S. polycephala* Bak. was originally described from Ocaña, 1,525–1,830 m., *Schlim 493, Holton 82*. It matches *S. diffusa*.

The stem is angled, but not conspicuously sulcate as in *S. eurynota* A. Braun. The texture of the leaves is firmer than *S. sertata* Spring. The median leaves have a slightly thickened margin, and are shortly acuminate (not aristate, as in *S. horizontalis* (Presl) Spring).

53. ***Selaginella horizontalis*** (Presl) Spring in Bull. Acad. Brux. x: 226 (1843).—A. Braun in Ann. Sci. Nat. sér. 5, iii: 292 (1865).—Alston in Journ. of Bot. lxii: 226 (1934).

*Lycopodium horizontale* Presl, Rel. Haenk.: 78 (1825).

*Selaginella sulcata* sensu J. Smith in Seem., Bot. Herald: 243 (1854) pro parte; non Desv.

*Selaginella diffusa* sensu A. Braun in Ann. Sci. Nat. sér. 5, iii: 302 (1865), pro parte; non Spring.—Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 705 (1886), pro parte.

*Selaginella eurynota* sensu Hemsl. in Godman & Salvin, Biol. C.-Amer. iii: 706 (1886), pro parte; non A. Braun?

*Selaginella fendleri* Bak. in Journ. of Bot. xxi: 334 (1883).

*Selaginella sylvatica* Bak., op. cit. xxii: 25 (1884).

COSTA RICA. Matachin, *Kuntze 81674* (NY); Wafer Bay, Cocos Island, *Svenson 320* (BM).

PANAMA. Santa Rita Trail, *Cowell 136* (NY), *148* (NY); Rio Tapia, Prov. Panama, *Standley 26137* (BM), *28239* (BM), *Maxon & Harvey 6643* (BM); Bella Vista, Prov. Panama, *Killip 12029* (NY); near Juan Diaz R., 75 m., *Killip 2619* (W); near Panama, *Seeman 31* (BM); Rio Tecumen, Prov. Panama, *Standley 26701* (BM); Cerro Gordo, near Culebra, *Standley 25994* (BM); Rio Grande, near Culebra, C.Z., *Pittier 2098* (NY); Culebra, C.Z., *Stevens 938* (W); Empire, *Hayes 228* (BM); Barro Colorado I., *Silvestre Avilles 2* (W), *Kenoyer 61* (W), *Standley 40811* (W), *40861* (W), *Starry 6* (W); Balboa, C.Z., *Standley 25448* (BM); Ancon Hill, 20–75 m., *Seibert 108* (W), 150 m., *Killip 2507* (W), *Standley 25171* (BM), *Alston 8686* (BM); near Gatun, *Standley 27250* (BM); Sosa Hill, Balboa, C.Z., *Standley 25268* (BM); Las Cruces Trail, between Fort Clayton and Corozal, *Standley 29132* (BM); forests around Porto Bello, Prov. Colon, 5–200 m., *Maxon 5768* (BM); Penonome, *Williams 474* (NY); near Fort Kobe, *Allen 2013* (BM); San Pablo, *Blake* (W); Chagres, *Fendler 382* (K, type of *S. fendleri* Bak.); Taboga I., *Killip 2644* (BM); Las Cascadas Plantation, near Summit, C.Z., *Standley 25717* (BM); forest near Madden Dam, C.Z., near sea-level, *Alston 8877* (BM); San José Island, Pearl Archipelago, *Johnston 156* (BM), *343* (BM), *365* (BM), *987* (BM), *1142* (BM).

Geographical range: Costa Rica to Colombia (*Smith 2238*) at low levels.

This species is often prostrate, as is shown in dried specimens by the angle between the stem and the rhizophore, and it is possible that some of the specimens with ascending stems should go under *S. eurynota* A. Braun.

Presl's type, at Prague, was collected by *Haenke*, and is labelled 'ex vallibus

Cordilleris Peruanis', but I have seen no similar plants from Peru, and it probably came from Panama.

54. **Selaginella eurynota** A. Braun in Ann. Sci. Nat. sér. 5, iii: 293 (1865); in Monatsb. Preuss. Akad. Wiss. Berl. 1865: 187, 193 (1866); in Ann. Sci. Nat. sér. 5, iii: 293 (1865).

*Selaginella mnioides* sensu Christ in Pittier, Primit. Fl. Costaric. iii, 1: 61 (1901); non A. Braun.

GUATEMALA. Cuyotenango, Dept. Suchitepequez, 500 m., *Torres Rojas* 144 (NY; W); Hacienda de Guacimo, U. *Fruit Co.* 90 (W); Mayatenango, *Bernoulli* 33 (K; NY), *Bernoulli & Cario* 149 (K); Pueblo Nuevo, Dept. Retalhulen, 1,800 m., *Torres Rojas* 555 (W); Finca S. Luis, Dept. Retalhulen, 450 m., *Torres Rojas* 557 (BM; W); Coalahuache, Dept. Quezaltenango, 1,800 m., *Torres Rojas* 556 (W); Finca El Zapote, Dept. Esquiltla, *Muenschner* 12173 (W).

NICARAGUA. Mosquito Coast, *Schramm* (W); Sansangta District, *Schramm* 23 (W), 53 (W), 54 (W); Cabo Gracias a Dios, *Schramm* (W).

COSTA RICA. Aguacate, *Hoffmann* 907 (K, type-collection); Livingston, *Rowlee* 34 (NY; W); Hamburg Finca, on Río Reventazon below Cairo, Prov. Limon, 55 m., *Standley & Valerio* 48823 (W), *Cufodonti* 682 (BM); Río Grande, *Brade* 835 (NY); Finca Montecristo, on R. Reventazón below Cairo, 25 m., Prov. Limon, *Standley & Valerio* 48612 (W); Port Limon, at sea-level, *Cook & Doyle* 445 (W); Pejivalle, 600 m., Prov. Cartago, *Valerio* 16 (W), 2234 (W), 900 m., *Standley & Valerio* 46748 (W), 46851 (W), 47175 (W); Forests of Tuis, 650 m., *Tonduz* 11345 (W); Santa Clara, *Cooper* 10203 (W); between La Junta and Fla, *Rowlee & Stork* 614 (W); San Luis de Turrubares, 450 m., *Valerio* 1731 (W); near El General, Prov. S. José, 640 m., *Skutch* 4020 (BM), 800 m., 2216 (W); banks of Río Grande near S. Ramon, 900-950 m., *Brenes* 14177 (W).

PANAMA. *Cuming* 1181 (BM).

Geographical range: Guatemala to Panama, from sea-level to 80 m.

The leaves in this species are normally larger than those of *S. horizontalis* (Presl) Spring, which is common in Panama.

In *S. schizobasis* Bak. the lateral leaves are only about 2.5 times as long as broad, and the auricles of the axillary leaves are divergent.

55. **Selaginella schizobasis** Bak. in Journ. of Bot. xxi: 333 (1883).

*Selaginella martensii* sensu Donn. Smith, Enum. Pl. Guat. iv: 180 (1895), pro parte; non Spring. *Selaginella tuerckheimii* Hieron. ex Donn. Smith, Enum. Pl. Guat. vi: 67 (1903), vii: 65 (1905) nom. nud.—E. Hofmann in Sitzb. Akad. Wiss. Wien, Math.-Naturw. Kl. cxxxix: 641 (1930) descr. anat.

MEXICO. Vera Cruz: Orizaba, *Scoville* (NY); Córdoba, *Copeland* 'P' (BM), *Hahn* 2025 (K), *Seaton* 396 (NY; W), *Carruthers* (BM), *Fisher* 3679 (W), 35364 (W), *Matuda* 231 (W), *Woronow* 2948 (W), *Kerber* 15 (BM); Chinameca, *Peniche* 41 (W); La Raya, *Gadow* (BM); Potrero Viejo, 600 m., *Copeland* 170 (BM); valley of Córdoba, *Bourgeau* 1425, 1655 (W). Tabasco: Santa Cruz, *Rovirosa* 539 (NY; W); Ocuapán, near Huimanguillo, *Archer* (W). Chiapas: *Ghiesbreght* 605 (K, type); Palenque, *Matuda* 3676 (K).



BRITISH HONDURAS. Forest shade, Forest Home, 61 m., *Schipp* 8-434 (BD); Roaring Creek, *Lundell* 394 (K; NY; W); Craig Point, Sibun R., *Gentle* 1396 (BM; W); El Cayo, on limestone, *Lundell* 6122 (W); Vaca, El Cayo District, on forest floor, *Gentle* 2543 (BM).

GUATEMALA. Near Puerto Barrios, near sea-level, Dept. Izabal, *Pittier* 373 (NY; W), *Standley* 24915 (W); Chicbul, Distr. Peten, *Lundell* 3377 (BM); Sierra del Mico, Dept. Izabal, *Kellerman* 7349 (NY); near Quirigua, Dept. Izabal, *Standley* 23735 (NY; W), 23783 (NY; W), 23907 (W), 24174 (NY; W), 24184 (W), 24582 (NY; W), 24671 (W); Cerro de Las Minas, Los Amates to Izabal, *Blake* 7810 (W); Quebrades, Dept. Izabal, *Blake* 7529 (W), 7540 (W); Cubilquitz, Dept. Alta Verapaz, *Türckheim* 8061 (NY; W), 8364 (W), 8365 (K; NY; W); Chihob, Alta Verapaz, 900 m., *Johnson* 950 (BM; W); vicinity of Secanquin, 550 m., *Maxon & Hay* 3155 (W), 3164 (BM; W); Secanquin, trail to Cahabon, *Goll* 32 (W); Cajabon, near Finca Sepacuite, Alta Verapaz, *Cook & Griggs* 349 (W); Finca Seamay, Senahu, Alta Verapaz, *Barton* 28 (BM), 34 (BM).

HONDURAS. Near San Juan, *Wilson* 238 (Morton MS.); San Pedro Sula, Dept. Santa Barbara, *Thieme* 5701 (K; NY; W); near Pito Solo, mountains east of Lake Yojoa, Dept. Cortés, 600-800 m., *Morton* 7776 (BM).

NICARAGUA. Along Karawala R., *Schramm* (W); Mosquito Coast, *Schramm* (W); Samsangata Distr., *Schramm* 22 (W); near Bragman's Bluff, *Englesing* 268 (W).

Geographical range: eastern Mexico to Nicaragua.

56. ***Selaginella kunzeana*** A. Braun in Ann. Sci. Nat. sér. 5, iii: 296 (1865).

*Selaginella schiedeana* sensu Christ in Dur. & Pittier, Primit. Fl. Costaric. i, 3: 255 (1896), pro parte; non A. Braun.

MEXICO. Durango: La Bajada, Tamazula, 300-600 m., *Ortega* 4287 (W). Colima: Tuxpan Cañon, *Orcutt* 4690 pro parte (W). Mexico: Temascaltepec, in woods on Volcán, *Hinton* 2491.

COSTA RICA. Boruca, *Tonduz* 4618 (BM; W); on bank near El General, 915 m., *Skutch* 3106 (W); trail to Buenos Aires, above Palmar Norte, 830 m., *Allen* 5904 (BM).

Geographical range: Mexico southwards to Peru.

#### INTRODUCED SPECIES

SELAGINELLA BRAUNII Bak.—Maxon in Amer. Fern Journ. xxvii: 111 (1937).—Brown & Correll, Ferns and F. Allies of Louisiana: 158, fig. 48 (1942).

Reported by Maxon (loc. cit.) as naturalized in an old catholic churchyard, St. Mary's, Georgia.

SELAGINELLA KRAUSSIANA (Kunze) A. Braun.

UNITED STATES. Virginia: Arlington, adventive in a lawn, Dec. 1951, *Norton* BM; said to have persisted several years.

This species is the most commonly cultivated, and has been found as an adventive in the British Isles, Chile and Ceylon. It is a native of S. and E. Africa, the Cameroon Mt. and the Azores.

SELAGINELLA PLANA (Desv.) Hieron.

A commonly cultivated Old World species which has been collected at Sabanas,

NE. of Panama City, *Bro. Paul* 196 (W). It is now naturalized in Trinidad and Puerto Rico. There is a good figure in Backer, *Hand. Suikerriet-Cult.* vii: 1, fig. 24 (1928).

## EXCLUDED SPECIES

SELAGINELLA ANOMALA sensu Fourn., *Mex. Pl.*: 148 (1872); non Spring.

MEXICO: in sylva Chiquihuite, *Bourgeau* 2156 (ex Fourn.).

*S. anomala* is a synonym of *S. porelloides*, and this must be a misidentification.

SELAGINELLA CALOSTICHA sensu Christ in Dur. & Pittier, *Primit. Fl. Costaric.* i, 3: 255 (1896) (as '*colosticha*'); non Spring.

COSTA RICA. Barba, 2,500 m., *Tonduz in Pittier* 1908 (ex Christ).

A little-known Venezuelan species. Presumably an error.

SELAGINELLA CHILENSIS (Willd.) Spring.—Conzatti, *Fl. Tax. Mex.* i: 141 (1946).

MEXICO. *Haenke* (ex Presl).

No doubt an error. This species seems to be the same as *S. usteri* Hieron., and the specimens collected by Haenke were presumably from the Philippines.

SELAGINELLA HOMALIAE A. Braun.—Fourn., *Mex. Pl.*: 148 (1872).—Hemsl. in Godman & Salvin, *Biol. C.-Am.* iii: 707 (1886).

MEXICO. Vera Cruz, Valley of Cordova, *Bourgeau* 2023 (ex Fourn.).

It is most unlikely that Bourgeau found this Brazilian species in Mexico.

SELAGINELLA LASIOPHYLLA A. Braun.—Urb., *Symb. Antill.* ix: 392 (1925).

MEXICO. (ex Urban).

The record is presumably an error. *S. lindenii* Spring may have been intended.

SELAGINELLA PANAMENSIS Linden, *Cat. No.* x: 22 (1855), *nom. nud.*

A. Braun (in *Index Sem. Hort. Bot. Berol.* 1857, App.: 23 and 1860, App.: 21) reduces this to the Amazonian *S. breynii* Spring.

SELAGINELLA PATULA sensu Christ in Dur. & Pittier, *Primit. Fl. Costaric.* i, 3: 255 (1896); non (Sw.) Spring.

COSTA RICA. Rio S. Pedro, between General and Buenos-Ayres, *Tonduz in Pittier* 3575 (ex Christ).

SELAGINELLA PORELLOIDES sensu Fée, *Mém. Fam. Foug.* ix: 36 (1857); non Spring.—Conzatti, *Fl. Tax. Mex.* i: 140 (1946).

MEXICO. Orizaba, 1854, *Schaffner* 117 (ex Fée).

This species is known from Guiana and Trinidad. Fée's record was doubtless a misidentification.

SELAGINELLA RUBELLA Moore.—Hieron. in Engl. & Prantl, *Nat. Pflanzenfam.* i, 4: 710 (1901).

This species was found by Mr. B. S. Williams of Victoria Nurseries, Holloway, on an imported orchid. There is a specimen in Herb. Moore labelled 'Hort. Williams 1870', which is presumably the type. Hieronymus stated that it was probably from Guatemala, but I consider it identical with *S. concinna* (Sw.) Moore from Mauritius.

*SELAGINELLA SCANDENS* sensu Christ in Dur. & Pittier, Primit. Fl. Costaric. i, 3: 253 (1896; non (Beauv.) Spring.

COSTA RICA. Savanes de Cabagra près de Buenos-Aires, 500-1,000 m., *Tonduz in Pittier 6551* (ex Christ).

This is an African species and the record is doubtless an error.

*SELAGINELLA SEEMANNI* Bak.

*Selaginella sulcata* sensu S. Smith in Seem., Bot. Herald: 243 (1885); non Desv.

*Selaginella barbacoasensis* Hieron. in Hedwigia xliii: 46 (1904).

COLOMBIA. Cacagual I., Choco Intend., on the ground, *Seemann 1006* (BM; K).

Some of the specimens on which J. Smith based his record for Panama of the Brazilian species *S. sulcata* belong to this species and were from the Choco in Colombia.

*SELAGINELLA TOMENTOSA* Spring.—Hieron. in Engl. & Prantl, Nat. Pflanzenfam. i, 4: 712 (1901).

Hieronymus records this species from 'Isthmus von Panama', but this is probably an error. It was originally described from Gorgona.

*SELAGINELLA TRUNCATA* sensu Christ in Dur. & Pittier, Primit. Fl. Costaric. i, 3: 254 (1896); non Karst.

COSTA RICA. Carrillo, *Pittier 569*.

Probably an error. The species is South American.



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9281 galeottii  
9295a pallescens  
MEYER, F. G., & RODGERS, D. J.  
2510 novoleonensis  
3049 delicatissima  
MILLER (Herb.)  
s.n. arthritica  
s.n. haematodes  
MILLSAUGH, C. M.  
1620 microdendron  
MOHR, C.  
1300 stenophylla  
s.n. delicatissima  
galeottii  
hoffmannii  
martensii  
MOHR, C., & BOTTERI, M.  
(See also Botteri & Mohr)  
s.n. delicatissima  
MOLINA, A.  
1847 huehuetenangensis  
2025 huehuetenangensis  
MOORE, H. E.  
5080 pallescens  
5114 pallescens  
5245 pallescens  
5267 pallescens  
5286 silvestris  
MOORE, H. E., & GATTY, R.  
5008 pilifera  
MOORE, J. A., & STEYERMARK,  
J. A.  
3502 pilifera  
MORALES, M. E. & A.  
525 galeottii  
MORRIS, D.  
s.n. umbrosa  
MORTON, C. V.  
7307 porphyrospora  
7577 guatemalensis  
7776 schizobasis  
7844 hoffmannii  
MUENSCHER, W. C.  
12170 porphyrospora  
12171 umbrosa  
12173 eurynota  
12174 martensii  
12175 martensii  
MULFORD, Miss  
266 lepidophylla  
MÜLLER, F.  
259 pallescens  
268 orizabensis  
365 pallescens  
367 delicatissima  
425 pallescens  
737 delicatissima  
2203 hoffmannii  
s.n. orizabensis  
MUNCH  
16 mollis  
37 apoda  
54 oaxacana  
NEALLY, G. C.  
557 pilifera  
NELSON, E. W.  
813 galeottii  
2472 martensii  
3348 galeottii  
6700 pilifera  
NICOLAS, Fr. (ed. Rosenstock)  
72 galeottii  
NORTON, J. B. S.  
s.n. see kraussiana  
O'NEIL  
82 ludoviciana  
D'ORBIGNY  
s.n. see galeottii  
ORCUTT, C. R.  
367 novoleonensis  
1234 pilifera  
2807 martensii  
2808 pallescens  
3370 galeottii  
3626 pallescens  
4035 porphyrospora  
4230 pallescens  
4401 porphyrospora  
4617 sertata  
4640 hoffmannii and clador-  
rhizans  
4651 pallescens  
4673 sertata  
4690 pro parte pallescens  
4690 pro parte kunzeana  
ORTEGA, J. E.  
366 pallescens  
429 marginata  
430 pallescens  
4287 kunzeana  
4465 marginata  
OSTENFELD, C. H.  
102 exaltata  
PALMER, E.  
47 sertata  
85 pallescens  
179 pallescens  
245 lepidophylla  
265 stenophylla  
266 delicatissima  
301 microdendron  
321 pilifera  
327 lepidophylla  
558 porphyrospora  
886 pallescens  
1401 lepidophylla  
1439 lepidophylla  
1440 lepidophylla  
1936 pallescens  
11366 lepidophylla  
12364 lepidophylla  
s.n. lepidophylla  
PARRY, C. C.  
s.n. arthritica  
PARRY, C. C. & PALMER, E.  
1008 pilifera  
1009 pallescens  
PAUL, Bro.  
196 plana  
PAXSON, J. B., WEBSTER, G. L.,  
& BARKLEY, F. A.

- 17M792 hoffmannii  
 PECK, M. E.  
     634 huehuetenangensis  
 PENICHE, J. M.  
     41 schizobasis  
 PENNELL, F. W.  
 16927 pilifera  
 17199 delicatissima  
 17636 pilifera  
 17995 stenophylla  
 19553 *see* novoleonensis  
 19831 pallescens  
 19954 pallescens  
 20184 pallescens  
 20187 marginata  
 PIPER, C. V.  
     4965 douglasii  
     5668 arthritica  
     5783 arthritica  
     5845 arthritica  
     s.n. ludoviciana  
 PITTIER, H.  
     118 estrellensis  
     191 idiospora  
     316 oaxacana  
     373 schizobasis  
     568 diffusa  
     569 *see* truncata  
 1820 galeottii  
 1908 (Tonduz) *see* calosticha  
 2098 horizontalis  
 2392 arthritica  
 2393 arthritica  
 2489 umbrosa  
 3030 pallescens  
 3575 (Tonduz) *see* patula  
 3638 intacta  
 3661 oaxacana  
 3885 umbrosa  
 4004 exaltata  
 4219 arthritica  
 4220 umbrosa  
 4325 exaltata  
 4720 umbrosa  
 5554 exaltata  
 5595 haematodes  
 5718 anceps  
 6551 (Tonduz) *see* scandens  
 8583 umbrosa  
 12089 arthritica  
 PITTIER, H., & TONDUZ, A.  
     3577 arthritica  
 POEPPIG, E. F.  
     s.n. *see* articulata  
 POLAKOWSKY, H.  
     115 porphyrospora  
     446A anceps  
     446B arthritica  
     500 arthritica  
 PRINGLE, C. G.  
     203 lepidophylla  
     271 pilifera  
     886 pilifera  
 1978 delicatissima  
 1979 pallescens  
 2037 pallescens  
 2038 novoleonensis  
 2040 schaffneri  
 2041 pilifera  
 2489 novoleonensis  
 2592 pallescens  
 2593 porphyrospora  
 2594 schaffneri  
 2634 delicatissima  
 2635 reflexa  
 3292 reflexa  
 3293 stenophylla  
 3296 delicatissima  
 6107 galeottii  
 8797 apoda  
 9282 pallescens  
 10326 reflexa  
 10815 apoda  
 11275 lepidophylla  
 11276 pilifera  
 11804 galeottii  
 13260 porphyrospora  
 13959 pilifera  
 15620 $\frac{1}{2}$  delicatissima  
 15630 schaffneri  
 PURPUS, C. A.  
     2177 galeottii  
     2177 pro parte martensii  
     2388 delicatissima  
     2389 stenophylla  
     2849 delicatissima  
     2938 schiedeana  
     3155 lepidophylla  
     5488 reflexa  
     5791 pallescens  
     5937 stenophylla  
     5937 pro parte silvestris  
     5938 hoffmannii [2]  
     6193 stenophylla  
     6193A pallescens  
     6437 hoffmannii  
     6438 delicatissima  
     6439 galeottii  
     6439 pro parte martensii  
     6720 porphyrospora  
     6721 porphyrospora  
     7220 martensii and hoffmannii  
     7222 hoffmannii  
     7438 porphyrospora  
     7439 schiedeana  
     8253 pallescens  
     8258 pallescens  
     8464 delicatissima  
     8922 galeottii  
     8924 delicatissima  
     8925 pallescens  
     14019 delicatissima  
     14034 delicatissima  
     15216 galeottii  
     15407 galeottii  
     15413 galeottii  
     16248 hoffmannii  
 PURPUS, J.  
     115 delicatissima  
     116 delicatissima  
     117 delicatissima  
     118 delicatissima  
     119 delicatissima  
     121 hoffmannii  
     122 hoffmannii  
     125 pallescens  
     126 pallescens  
     127 stenophylla  
     128 stenophylla  
     129 pallescens  
     130 galeottii  
     131 galeottii  
     464 delicatissima  
 RANGEL in ARSÈNE  
 10683 porphyrospora  
 RECORD, S. J.  
     s.n. umbrosa  
 RICHARDSON, H.  
     s.n. armata  
 RIDGWAY, Mrs. ROBERT  
     s.n. oaxacana  
     s.n. diffusa  
 RINGGOLD, C., & ROGERS, J.  
     3 porphyrospora  
 ROBERTSON, J.  
     144 umbrosa  
     245 umbrosa  
 RODRIGUEZ  
     289 huehuetenangensis  
 ROJAS, R. TORRES (*see* Torres  
     Rojas)  
 ROSE, J. N.  
     3148 marginata  
 11198 lepidophylla  
 ROSE, J. N., & HAY, R.  
     6140 martensii  
 ROSE, J. N., & PAINTER, J. H.  
     6455 pallescens  
     6943 porphyrospora  
     7250A delicatissima  
     7250 pro parte porphyrospora  
     7250 pro parte delicatissima  
     7498 lepidophylla  
 ROSE, J. N., PAINTER, J. H., &  
     ROSE, J. S.  
     9391 reflexa  
 ROSE, J. N., STANDLEY, P. C., &  
     RUSSELL, P. G.  
     12859 pallescens



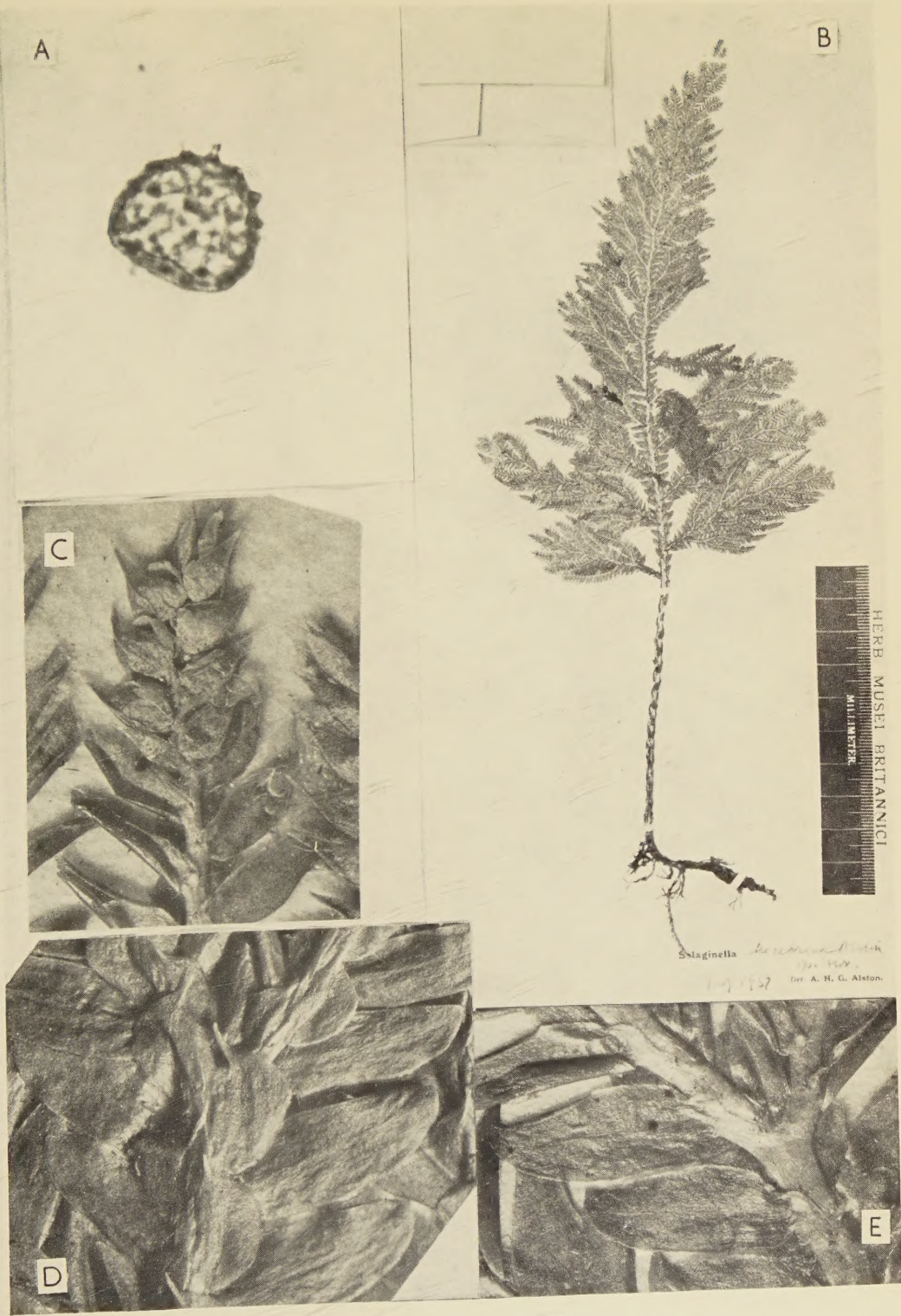
- ROVIROSA, J. N.  
   539 schizobasis  
   615 illecebroso  
   868 oaxacana  
   869 hoffmannii  
 ROWLEE, W. W.  
   33 umbrosa  
   34 eurynota  
   129 pallescens  
   217 oaxacana  
   341 intacta  
   403 exaltata  
 ROWLEE, W. W., & STORK, H. E.  
   614 eurynota  
   621 arthritica  
   817 anceps  
 ROZYSKI, H. W. VON  
   42 lepidophylla  
 RUGEL, F.  
   s.n. ludoviciana  
 RUSBY, H. H.  
   83 lepidophylla  
  
 SALAZAR, A. E.  
   429 sertata  
 SALLÉ, A.  
   s.n. delicatissima  
   s.n. galeottii  
 SALVIN, O., & GODMAN, F. D.  
   146 convoluta  
   189 pallescens  
   s.n. guatemalensis  
   s.n. huehuetenangensis  
   s.n. umbrosa  
 SANDOVAL, R. D.  
   18 martensii  
 SARTORIUS, C.  
   s.n. delicatissima  
   s.n. orizabensis  
   s.n. pallescens  
   s.n. porphyrospora  
 SCHAFFNER, J. G.  
   6 stenophylla  
   7 martensii  
   8 schaffneri  
   9 delicatissima  
   13 pallescens [2]  
   14 lepidophylla  
   117 *see* porelloides  
   934 pallescens  
   935 lepidophylla  
   936 schaffneri  
   s.n. delicatissima  
   s.n. pallescens  
 SCHIEDE, C. J. W.  
   825 pallescens  
   s.n. schiedeana  
   s.n. pallescens  
 SCHIEDE, C. J. W. & DEPPE, F.  
   s.n. galeottii  
  
 SCHIPP, W. A.  
   51 umbrosa [2]  
   52 galeottii  
   99 microdendron  
   924 ovifolia  
   925 mollis  
   8-434 schizobasis  
   8-817 cladorrhizans  
   8-818 guatemalensis  
   8-820 huehuetenangensis  
 SCHLIM, L.  
   493 *see* diffusa  
   660 umbrosa  
 SCHMITZ, A.  
   s.n. lepidophylla  
   s.n. pallescens  
 SCHOTT, A. C. V.  
   669 convoluta  
 SCHRAMM, REV. F. E.  
   2 flagellata  
   18 flagellata  
   20 mollis  
   22 schizobasis  
   23 eurynota  
   53 eurynota  
   54 eurynota  
   55 mollis  
   s.n. eurynota [2]  
   s.n. mollis  
   s.n. schizobasis [2]  
 SCHULTZE-JENA  
   670 sertata  
   799 porphyrospora  
 SCHUMANN, W.  
   1905 mosorogensis  
 SCOVILLE, F. V.  
   s.n. schizobasis  
 SEATON, H. E.  
   307 pallescens  
   396 schizobasis  
   397 hoffmannii  
 SEEMANN, B.  
   29 flagellata  
   31 horizontalis  
   32 flagellata  
   234 arthritica  
   281 viticulosa  
   1006 *see* seemanni  
   1558 pallescens  
   s.n. lepidophylla  
 SEIBERT, R. J.  
   108 horizontalis  
   311 pallescens  
   451 articulata  
   563 arthritica  
   611 haematodes  
 SELER, G. E.  
   206 stenophylla  
   384 pallescens  
   749 stenophylla  
  
   1232 pallescens  
 SHAKESPEAR, R.  
   s.n. exaltata  
 SHANNON, W. C.  
   128 sertata  
   129 pro parte sertata  
 SINCLAIR, A.  
   49 sertata  
   s.n. sertata  
   s.n. *see* galeottii  
 SKINNER, G. U.  
   s.n. pallescens  
   s.n. umbrosa  
 SKUTCH, A. F.  
   627 porphyrospora  
   699 porphyrospora  
   2216 eurynota  
   2543 anceps  
   3106 kunzeana  
   3190 porphyrospora  
   3371 estrellensis  
   3375 porphyrospora  
   3493 diffusa  
   3494 oaxacana  
   3632 oaxacana  
   3896 arthritica  
   4020 eurynota  
   4061 anceps  
 SMALL, J. K., & CARTER, J. J.  
   1147 armata  
   3224 armata  
   s.n. armata  
 SMITH, H. H.  
   2238 *see* horizontalis  
 SMITH, J. Donnell (*see* Donnell  
   Smith)  
 SPENCE, J. H.  
   s.n. stenophylla  
 SPRUCE, R.  
   4627 *see* articulata  
 STANDLEY, P. C.  
   8806 huehuetenangensis  
   9061 huehuetenangensis  
   10269 hoffmannii  
   10983 hoffmannii  
   11248 sertata  
   11529 sertata  
   19176 mollis  
   19184 huehuetenangensis  
   19191 pallescens  
   19217 huehuetenangensis  
   19311 arthritica  
   19327 arthritica  
   19400 huehuetenangensis  
   19510 pallescens  
   19695 mollis  
   19757 hoffmannii  
   20060 huehuetenangensis  
   20144 huehuetenangensis  
   21197 pallescens

22460 umbrosa	35377 estrellensis	46868 oaxacana
23277 pallescens	35566 estrellensis	46962 oaxacana
23690 huehuetenangensis	35595 estrellensis	47006 oaxacana
23735 schizobasis	35620 estrellensis	52752 silvestris
23748 umbrosa	35886 pallescens	52755 umbrosa
23783 schizobasis	35950 porphyrospora	52940 illecebrosa
23907 schizobasis	36120 anceps	53320 illecebrosa
23908 huehuetenangensis	36193 lychnuchus	54595 umbrosa
24173 huehuetenangensis	36200 oaxacana	55920 huehuetenangensis
24174 schizobasis	36278 oaxacana	56191 guatemalensis
24184 schizobasis	36279 lychnuchus	56217 porphyrospora
24582 schizobasis	36296 diffusa	56791 oaxacana
24671 schizobasis	36501 diffusa	STANDLEY, P. C., & TORRES, R.
24707 huehuetenangensis	36608 galeottii	47489 porphyrospora var.
24839 umbrosa	36760 arthritica	47493 porphyrospora
24840 umbrosa	36798 arthritica	47704 porphyrospora
24915 schizobasis	36825 anceps	47706 silvestris
25171 horizontalis	36841 anceps	47763 estrellensis
25171A flagellata	37037 anceps	51021 galeottii
25268 horizontalis	37086 bombycina	51074 galeottii
25448 horizontalis	37269 bombycina	51091 galeottii
25717 horizontalis	37580 porphyrospora	51183 galeottii
25994 horizontalis	37585 porphyrospora	51375 galeottii
26131 arthritica	37724 galeottii	STANDLEY, P. C., & VALERIO, J.
26137 horizontalis	37748 porphyrospora	44569 silvestris
26165 arthritica	37776 oaxacana	44600 arthritica
26164 cladorrhizans	37810 oaxacana	44641 arthritica
26701 horizontalis	37876 oaxacana	44755 arthritica
26850 flagellata	38063 porphyrospora	44761 arthritica
27250 horizontalis	38064 silvestris	44955 arthritica
27415 arthritica	38087 diffusa	45189 silvestris
27456 arthritica	38142 oaxacana	45278 arthritica
28239 horizontalis	38178 oaxacana	45389 silvestris
28402 arthritica	38217 oaxacana	45455 arthritica
28414 arthritica	38219 porphyrospora	45881 arthritica
28424 flagellata	38351 porphyrospora	46476 arthritica
29132 horizontalis	38352 estrellensis	46748 eurynota
29346 arthritica	38358 porphyrospora	46851 eurynota
29911 arthritica	38554 porphyrospora var.	46881 novae-hollandiae
31099 arthritica	38619 porphyrospora	46891 arthritica
31270 arthritica	38625 porphyrospora	46968 novae-hollandiae
31389 mollis	38647 estrellensis	47006 oaxacana
31487 arthritica	38668 intacta	47175 eurynota
31693 arthritica	39171 estrellensis	48382 arthritica
32439 pallescens	39189 estrellensis	48505 arthritica
32903 intacta	39273 estrellensis	48602 umbrosa
32934 porphyrospora	39365 galeottii	48612 eurynota
32952 intacta	39614 martensii	48728 intacta
32955 diffusa	39615 galeottii	48823 eurynota
33007 estrellensis	39625 galeottii	48852 intacta
33056 diffusa	39848 galeottii	49071 intacta
33060 silvestris	39866 martensii	49176 porphyrospora
33445 martensii	40811 horizontalis	49696 porphyrospora
33459 galeottii	40840 arthritica	50267 intacta
33550 silvestris	40861 horizontalis	50484 intacta
33684 porphyrospora	40957 haematodes	51442 silvestris
33857 galeottii	41090 mollis	51865 porphyrospora
35029 porphyrospora var.	41670 porphyrospora	51887 diffusa
35046 porphyrospora var.	42644 porphyrospora var.	51971 estrellensis
35151 porphyrospora var.	45278 arthritica	52268 silvestris

- STARRY, D. E.  
6 horizontalis
- STEERE, W. C.  
1365 microdendron  
1944 sertata  
2171 convoluta
- STEVENS, F. L.  
555 exaltata  
938 horizontalis
- STEYERMARK, J. A.  
39925 porphyrospora  
39947 umbrosa  
39979 huehuetenangensis  
41579 illecebroso  
41629 umbrosa  
42201 pallescens  
42202 pallescens  
42203 porphyrospora  
42994 pallescens  
43407 pallescens  
43917 martensii  
44102 huehuetenangensis  
44135 pallescens  
44174 pallescens  
44455 guatemalensis  
44592 pallescens  
44685 galeottii  
44745 oaxacana  
44826 huehuetenangensis  
45273 huehuetenangensis  
45512 flagellata  
45657 reflexa  
45683 guatemalensis  
45767 pallescens  
45822 cladorrhizans  
45828 umbrosa  
45839 huehuetenangensis  
45854 cladorrhizans  
46595 pallescens  
46672 martensii  
47428 pallescens  
48671 guatemalensis  
48822 galeottii  
48951 pallescens  
49157 oaxacana  
49406 huehuetenangensis  
49408 huehuetenangensis  
49418 oaxacana  
49565 hoffmannii  
49718 galeottii  
49890 pallescens  
50006 porphyrospora  
50661 pallescens  
50888 pallescens  
51661 galeottii
- STOCKER, C. L.  
1929 umbrosa
- STORK, N. E.  
122 anceps  
447 oaxacana
- 1668 arthritica  
2265 anceps
- SUKSDORF, W. N.  
s.n. douglasii
- SVENSON, H. K.  
320 horizontalis
- TATE, R.  
81 arthritica  
s.n. huehuetenangensis
- THIEME, C.  
5700 hoffmannii  
5700B hoffmannii  
5701 schizobasis
- TITFORD, W. J.  
s.n. convoluta
- TONDUZ, A.  
686 pallescens  
752 pallescens  
927 porphyrospora  
1297 pallescens  
2082 silvestris  
4170 estrellensis  
4434 novae-hollandiae  
4618 kunzeana  
4799 novae-hollandiae  
4857 oaxacana  
6551 oaxacana  
7316 (ed. J. D. S.) anceps  
7643 anceps  
9491 anceps  
10694 porphyrospora var.  
10696 porphyrospora var.  
11343 anceps  
11344 arthritica  
11345 eurynota  
12584 oaxacana  
13349 oaxacana  
13761a sertata  
13761b flagellata  
13762 pallescens  
14552 intacta  
14553 arthritica  
s.n. oaxacana
- TONDUZ, A., & TORRES ROJAS  
7 silvestris
- TORRES ROJAS, RUBÉN  
141 galeottii  
144 eurynota  
555 eurynota  
556 eurynota  
557 eurynota
- TÜRKHEIM, H. VON  
4 (ed. Keck) galeottii  
4a (ed. Keck) galeottii  
79 guatemalensis  
653 guatemalensis  
653 oaxacana  
679 oaxacana  
701 hoffmannii
- 832 porphyrospora  
972 galeottii  
1578 (ed. Donnell Smith) porphyrospora  
8061 schizobasis  
8360 guatemalensis  
8361 guatemalensis  
8362 guatemalensis  
8363 guatemalensis  
8364 schizobasis  
8365 schizobasis  
8485 oaxacana  
8486 pallescens  
8652 hoffmannii  
8653 (ed. Donnell Smith) flagellata
- II. 772 flagellata  
II. 1268 galeottii  
II. 1363 galeottii  
II. 1369 porphyrospora  
II. 1386 pallescens  
II. 2036 porphyrospora  
II. 2114 stenophylla  
II. 2180 delicatissima  
s.n. guatemalensis  
s.n. galeottii
- TUTIN, T. G.  
1544 *see* revoluta
- UNITED FRUIT CO.  
90 eurynota
- VALDEZ, P.  
50 convoluta
- VALERIO, MANUEL  
1 galeottii and porphyrospora  
2 oaxacana  
4 estrellensis  
5 anceps  
6 novae-hollandiae  
10 diffusa  
11 anceps  
12 arthritica  
13 oaxacana  
16 eurynota  
17 novae-hollandiae  
19 porphyrospora  
21 hoffmannii  
1731 eurynota  
1806 minima  
1884 porphyrospora  
2086 minima  
2234 eurynota  
2238 porphyrospora  
2241 galeottii  
2243 porphyrospora  
2244 diffusa  
2362 porphyrospora var.  
2363 intacta



- 3367 *sertata*
- WATSON, SERENO  
106b *porphyrospora*
- WAWRA, VON FERNSEE, H.  
2517 *see lepidophylla*
- WEBER  
s.n. *orizabensis*
- WENDLAND, H.  
771 *oaxacana*
- WERCKLÉ  
596 *umbrosa*
- 17037 *intacta*  
s.n. *oaxacana*
- WHERRY, E. T.  
s.n. *ludoviciana*
- WHITE  
522 *pilifera*
- WILKINSON, E.  
s.n. *pilifera*
- WILLIAMS, B. S.  
s.n. *see rubella*
- WILLIAMS, L. O., & MOLINA, A.  
10310 *pallescens*  
14910 *convoluta*  
14940 *porphyrospora*  
15916 *hoffmannii*
- WILLIAMS, R. S.  
474 *horizontalis*  
475 *arthritica*  
476 *exaltata*  
894 *tarapotensis*  
895 *haematodes*
- WILSON, P.  
67 *silvestris*  
91 *umbrosa*  
217 *umbrosa*  
238 *schizobasis*
- WORONOW, G. N.  
2948 *schizobasis*  
2956 *galeottii*
- WRIGHT, C.  
3 *porphyrospora*  
827 *lepidophylla*  
s.n. *pilifera*
- s.n. *pilifera*  
YOUNG, V. H.  
s.n. *douglasii*
- YUNCKER, T. G.  
4505 *silvestris*  
4952 *umbrosa*
- YUNCKER, T. G., DAWSON, R. F.,  
& YOUSE, H. R.  
5572 *pallescens*  
5697 *pallescens*  
5707 *huehuetenangensis*  
5719 *pallescens*  
5722 *pallescens*  
5840 *guatemalensis*  
6214 *guatemalensis*  
6436 *guatemalensis*
- YUNCKER, KOEPPER, &  
WAGNER, .  
8490 *silvestris*  
8728 *idiospora*  
8783 *hoffmannii*  
8820 *oaxacana*



*Selaginella illecebrosa* Alston

A. Microspore ( $\times 1000$ )

B. Plant (half nat. size)

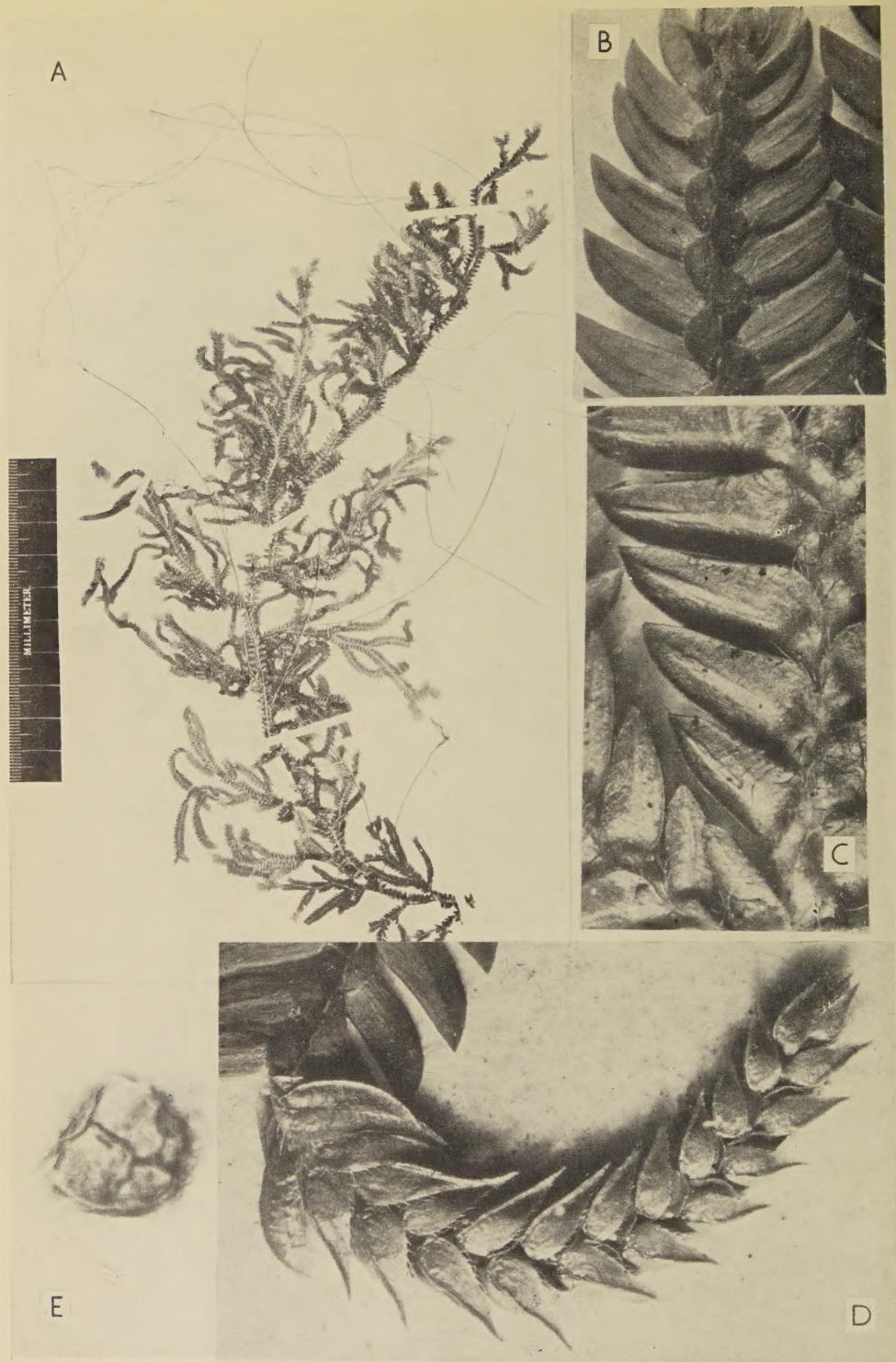
C. Strobilus ( $\times 8$ )

D. Median leaves ( $\times 8$ )

E. Lateral leaves ( $\times 8$ )

All from the type-specimen (Steiermark 41579)





*Selaginella idiospora* Alston

A. Plant (approx. half nat. size)

C. Lateral leaves ( $\times 8$ )

B. Median leaves ( $\times 8$ )

D. Strobilus ( $\times 10$ )

E. Microspore ( $\times 1000$ )

All from the type-specimen (Pittier 191)





